JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES—GAS, &c.

The Lighting Season and Competition.

"THE evenings are drawing in" is a colloquial remark that is now frequently heard; but it does not convey news nor does it give an opening for contention, as the fact is as patent to the hearer as it is to the utterer. But that the hours of darkness are again lengthening, causes an increase once more of the weight of responsibility—a responsibility that grows year by year with custom—upon those who have charge of the supply of the means for the procuring of artificial light. But, as a set-off to their greater responsibility and anxiety, they look for a season of good business. The disparity, however, existing between the summer and winter output, for gas manufacturers—wide as it still is—is not so great now in proportion to the business done, as it was a score or so years ago, when cooking by gas had only fairly started on the road to its present popularity and the first inventors of successful prepayment meters were still working to attain reliability. The long and beautiful summer to the close of which we are now drawing—sometimes perhaps it has been too hot to have been altogether comfortable—has no doubt caused the consumption of gas for lighting purposes to have been rather less than it otherwise would have been. But the gas cooking range and new consumers have jointly kept the station meter hands registering high outputs for the season of the year (some that we heard of for July and August have been record one for those months), and those outputs have completely submerged any little restriction in consumption for lighting that there may have been due to "natural causes." On the other hand, where electricity stations have no traction load, where the demand for power is scarce, and where there is an almost entire dependence upon the lighting business, there the past six months must have been cheerless ones, from the business point of view, for station engineers and managers.

It is, however, the present and the immediate future that have to be looked to. Now is the time to advise and render assistance to consumers before the days further shorten; and now is the time when the householder may be induced to overhaul his lighting fittings, and get them into good working condition for the days that are before us with their longer periods of darkness. Electricians in many places have evinced their appreciation of this; and it would be idle to ignore the fact that every new season finds the official staff of most electricity undertakings keener than ever in the attempt to stimulate new business. There have been loud complaints of the slow progress of electricity, of the insignificant relation that the new business has to the efforts put forward and the expense involved in securing it, and of the increasing leanness of the profit on the business generally, owing to the competition of gas, and the reductions forced upon suppliers. These are potently inciting conditions for the station engineer, who has to bear the brunt of the discontent; and they incline his wit and energy more and more to putting a better aspect upon these conditions. Whatever he achieves in the way of success is to the loss of the gas supplier.

In the competition, there are three directions in which operations must be unremittingly pursued. Most important of all is the defence and retention of what an undertaking possesses; secondly, the development of new business; and, thirdly, the recovery of lost custom. In not one of these directions can the staff of a gas undertaking afford to show a trace of negligence; in all, diplomacy must be exercised, but never duplicity, for the statement that is not, or cannot be, afterwards substantiated has a tortious effect. In the gas industry, we are exceedingly well equipped for operating in all three directions for the lighting season now at hand. Of high-power lamps—high-pressure gas or air systems, or lamps without auxiliary aid—we have now a good selection; and expense is being reduced in connection with them. The high-power lamps with clusters of inverted burners for exterior and large interior lighting are exceptionally good for quickly transforming dulness to effulgence. For ordinary lighting, good upright incandescent burners are cheap; and inverted gas-burners have been greatly improved and reduced in price. In both the ordinary and bijou forms, they are, we believe, destined to do yeoman service for the gas industry. The street lighting scheme for Edinburgh with inverteds of a type to consume only 2¼ cubic feet of gas per hour, will have quite a distinguished amount of attention paid it; and it might be the beginning of extensive applications of this type of lamp for outdoor purposes. Then for indoor use, preference between the ordinary and bijou forms of burners will be guided largely by requirement; but the fullest possible consideration should be given to bijou types, on account of conveniences as well as of economy. On the point of economy, one of these burners of the best makes, consuming only about 1 cubic foot of gas per hour, is quite equal to the illuminating power of metallic filament lamps giving about 25 candles, upon which the electrical industry are placing such high hopes at the present time. It makes a good advertisement to be able to say that a light equal to a 25-candle power metallic filament lamp can be obtained for 1000 hours at the expenditure of the price of 1000 cubic feet of gas, *plus* the cost of mantles, whose running life is good. The means of light and consumption division and subdivision that the bijou burners put into the hands of consumers are also valuable; and their separation on either brackets or multi-armed pendants, while effective, has a wonderful effect in preserving the cleanliness of ceilings.

Electricians recognize the uphill fight they have against gas lighting nowadays on the points of economy and efficiency; and bijou inverted burners have increased their difficulty. The electrical industry, however, though still distantly in the rear, has made headway in both respects. But it has not been accompanied by any more reliability than of old. And so far the progress has not stimulated the electric lighting business to any appreciable extent. We read of one observant electrician saying: "The rate of new "connections has in most cases reached a negative value;" and all round there are groanings over the consumers' apathy in respect of the renewal of their electric incandescent lamps, for inefficient electric lamps are marvellous bill inflators. However, these conditions necessitate what our American friends describe as push; and a hundred-and-one methods have been propounded for speeding-up business and conciliating discontented consumers. A great amount of reliance is just now being placed upon the new metallic filament lamps of exotic, and not one of British, derivation—the best known being the Tantalum, the Nernst, and the Osmium; while America is sending over the General Electric Metallized Filament Lamp, which is to be known as the "Gem," but the efficiency of which is not so good as the best of the older metallic filament lamps, whatever may be its reputed life. It is fully recognized by electricians that they must get a lamp that will match in all respects the economy and efficiency of the incandescent gas-burner; for incandescent gas-burner users only smile when they listen to the sophisms and the not disinterested prating of the electrical canvasser as to the mischievous effects of gas lighting, and remember the mischievous pocket effect that their electricity-consuming neighbours report. Electricity canvassers ought to evade healthy looking householders, who have used gas all their lives, and know that their fathers did the same before them. But the canvassers do not discriminate, and so do not make much headway. The lamps of the Tantalum, Nernst, and Osmium types are all that the electrical industry have at hand at present with which to compete with the vertical and inverted incandescent gas-burners; and station engineers are being urged

to work them for all they are worth, until consumers find out their idiosyncrasies. As a means of pacification, the Nernst lamp people are suggesting that, "in order to make "sure that the consumers get the best value for their "money, and in order not to let those who grumble at "their current bill fall into the hands of the gas com-"panies," a maintenance scheme should be adopted. Maintenance is not new to the gas industry; but it is worth noting that the electricians are adopting it as a means of retaining business.

Another of the points that must not be overlooked by gas managers is that the price of the metallic filament lamps that are going to be vigorously pushed as something superior to the old carbon filament lamps have had their prices reduced —in the case of the tantalum lamp from 5s. to 2s. 9d. Whether or not maintenance is adopted, such prices as are now charged are heavy in comparison with the carbon filament lamp; and efficiency and longevity (if the consumer is fortunate in getting good lamps and steady voltages) will not alone convince all lay users that they are getting a balance to the good by having to pay two-and-a-half times more for the new lamps than for carbon filament lamps. With incandescent gas lighting, the cheapness of mantle renewal, and the knowledge that the illuminating power can be maintained at the burner, and is not subject to fluctuating influences—commencing, with electricity, at the generating-station—are strong recommendations.

It is with these lamps, however, that the immediate fight has to be made; and with incandescent burners gas can well out-distance them. But we are not so foolish as to think that these lamps constitute the last word that is going to be said in the cheapening of electric lighting; and, on the other hand, we have no misgivings as to gas lighting having reached its zenith in improvement. In other directions, there are extensions in the electricity industry of assisted wiring, hire purchase, and provision at a rental of fittings, arc lamps, and motors—a subject dealt with in the "Electric Lighting Me-"moranda" to-day. It is very essential that gas engineers and managers should keep on the track of all endeavour on the part of their business competitors, whose determination to press the competition more strenuously than ever excites in the gas industry no fear regarding the result.

Horizontals, Inclineds, or Verticals?

THE question of the actual superiority or working costs of the horizontal and inclined systems of carbonizing may be said never yet to have been altogether definitely settled. This is no doubt partly due to the absence of any standardized form of making such calculations, and also in part, perhaps, because there is no clearly cut-and-dried answer which would be universally endorsed. Circumstances, of course, alter cases; and nothing is so difficult as to make comparisons absolutely and indisputably fair and correct, when so many elements enter in to vitiate the result. But still there is no sound reason why we should not get to something more approximate than the present disordered methods of presenting returns. Numerous have been the attempts to prove the advantages of inclined retorts, for example, over machine-charged horizontals; but can it really be said that there has been any one unimpeachable, authoritative, and final statement on the subject? We are not regretting that this is so; for it is realized that, in the nature of things, such a consummation, however devoutly to be wished, is hardly practicable, or, we had almost said, desirable. Because one engineer, in building a new works, decides upon one form of carbonizing plant, it does not follow that a neighbouring engineer cannot equally justifiably arrive at the conclusion that an altogether different method will suit him better. This may sound a somewhat elementary proposition to advance; but none the less it sometimes has need of being stated.

Now that a third kind of retorting has come into prominence, we may very well have endless comparisons between the three, and the varieties of each: Horizontals and the different machines; inclineds, and the various settings; verticals, and the differing solutions. In another part of the present issue, is given what is probably the first attempted comparison in regard to the working costs of these three systems. It is the work of two engineers in Holland—Heeren Cool and Hendricks. Though their effort contains a great deal that is of interest, we cannot say that the sum of knowledge is much further advanced; and where in the composition actual results are given, they can only be taken like any other results of ever-varying local conditions. These conditions are—under the circumstances, naturally enough—not set out in the paper; but full importance must be given to them. At the present day, it is not of much, if any, consequence to record a saving of 61 per cent. on the cost of coal carbonized by an installation of inclined retorts compared with hand charged and drawn horizontals. What is of greater interest in the paper referred to, is the fair attempt of the authors to ascertain the cost per 1000 cubic metres of gas for different methods of carbonization, allowing in each case for amortization and interest upon capital. The English equivalents of these results would appear to be a cost of 4·72d. per 1000 cubic feet of gas made in horizontal retorts without machines, 3·92d. for horizontals with machines, and 4·23d. for inclined retorts. But, as in all such cases, these figures cannot be of general application; and very many matters as to the accuracy of the sums included have to be carefully taken into consideration.

Without going into these in detail, readers are referred to the various items given in the authors' table, which they can investigate for themselves. The working costs are on a rather low basis of wages paid, quite inapplicable in our country. It will also be seen that costs of installing vertical retorts are conspicuous by their absence. This is perhaps not surprising. But as the authors are evidently familiar at least with the Settle-Padfield system; and as there are now, we believe, in Holland plants erected on it, it might have been thought they would have ascertained and included such costs in their statement. Their strictures on other systems are also merely to be taken as personal opinions of (till last week) anonymous writers. One is doubly doubtful as to the value to be attached to them when we find that "there are not within [their] knowledge practical means for "mechanically drawing the coke from retorts 3 metres "long." It is also somewhat curious to contrast the authors' hesitation and carefulness as exemplified in the statement that "selection to-day can only be made between inclined "retorts and horizontal machines, because there has been "too little experience with vertical retorts," with the over-robust confidence of the remark "that the retort-house plant "described is better than that of the Mariendorf works," and that "a careful comparison of our design with that of the "Mariendorf plant will persuade any practical technician of "the advantages of our proposals." Self-confidence is no doubt a great asset in going through life; but such faith as this is better felt than actually expressed.

In conclusion then, while commending to our readers the paper as an interesting technical contribution, on an ever topical subject, we can hardly regard it as anything but a slight, though fair, effort toward the solution of the large and difficult problem of the future carbonization of coal.

The Gathering of Gas Engineers in Milan.

THE gathering of gas engineers which took place in Milan last Tuesday (as incidentally referred to in the foregoing article, and of which an account appears in another column) justifies to only a limited extent the title of "international" that was given to it, inasmuch as no representative gas engineer was present from either England or Germany. This may be accounted for by the fact that it is rather a "far cry" from both countries to the capital of Lombardy; and, moreover, the subjects to be considered were of local rather than of general interest. The meeting of the Swiss Society at Lugano enabled the members to join their Italian colleagues at the cost of a pleasant day trip on the lakes; whereas, for Englishmen and Germans, attendance meant a long journey. However, there were two representatives from Holland—one being Heer Bolsius, the Editor of "Het Gas." The papers that were read at the meeting of the Swiss Society were rather technical than administrative; while the subjects which came before the Italian Society were of the latter character. Further notice of them may be taken on some future occasion. Meanwhile, attention may be called to the matter dealt with by Signor Beria, of Turin. It was referred to in our columns a short time ago. As far as we understand the question, the supply of the city is, in a sense, on the co-operative system—that is to say, when the Company have made a certain amount of profit, they must reduce the price of gas. But, taxed by the Government on the one hand and by the Municipality on the other, they are severely handicapped. Proceedings are pending which the

Company hope may be successful in the long run. The labour question is one on which French and Italian managers have something in common. Two petitions have been presented by the Italian Society on this matter; and French managers have now to face the new law on the one-day rest which came into operation at the beginning of the present month. Another matter which is engaging the serious attention of the Italian Society, and on which they have memorialized the President of the Chamber of Deputies, is the proposed increased taxation of meters. Such things as these tend to hamper the operations of gas companies on the Continent. It may not be without benefit, therefore, to have conferences of the members of two or three Societies such as that just closed, though they may not be productive of any striking advance in the technical branch of the industry. An outstanding feature of the Milan Congress was the hospitality shown to those attending it by the Cie. L'Union des Gaz. The excursion on Wednesday was a delightful finish to the meeting; and it will be long remembered by everybody who had the good fortune to participate in it.

Dr. Colman on Blending Producer and Coal Gas.

We are able this week to simultaneously publish an abstract of Mr. R. G. Shadbolt's patent specification of his system of blending producer gas with coal gas and a studied criticism of the process by Dr. Harold G. Colman. It must not be thought that, in the criticisms that have hitherto been made, it has been assumed that Mr. Shadbolt has only been prosecuting some idle fancy. There is no doubt that he has been working honestly and thoroughly; but when he has finished, the utmost he will have done will have been to have opened up in knowledge a fresh *cul-de-sac*, the enrichment from which will be of an order that will not be commensurate with the work he has put, and is putting, into it. Dr. Colman sets those right who think that the Grantham process is essentially nothing more than a variation of the old practice of drawing in the gases around the retorts by over-running the exhauster. It is something more than that. It is a process in which its author selects his producer gas so as to get it of as good a quality as possible. But after he has taken this trouble, Dr. Colman—conclusively, it may be said—shows that the advantage Mr. Shadbolt is hunting for will prove itself to be nothing more than a will-o'-the-wisp. Whether the test of calorific power is applied, the permissible reduction in price charged to the consumer relatively to the reduction in calorific power, or the flame temperature of the blended gas, the benefit of the blend is found to be a negative quantity. The article by Dr. Colman is truly an enlightening one, and will assist in giving point to any controversy that may hang round the process.

A Gas Exhibition for the Manchester District.

The Earl's Court Gas Exhibition of 1904 is responsible for creating a demand for representative displays of the kind; and the Manchester District Institution of Gas Engineers and the Dublin Gas Company were early moving in the direction of making arrangements for their respective districts. In the latter case, however, the Irish International Exhibition of 1907 offered an exceptionally good opportunity for a Gas Section; and plans were immediately made, and are already far developed. But the scheme of the Manchester Institution has been held in abeyance. Now, however, from a communication received from Mr. H. Kendrick, the Hon. Secretary of the Manchester Institution, and reproduced elsewhere in this issue, it is seen that it has been determined to hold an exhibition in Manchester in October 1907. The period fixed upon is rather unfortunate; and we should be sorry if the double event in the year proved detrimental to either the one or the other display, as nothing would give greater pleasure than to see both brilliant successes. It will be a pity if any discredit is brought upon the industry by any other result. Mr. Kendrick points out that the Manchester Exhibition has not been decided upon in opposition to Dublin. We do not for one moment believe that it has; but we cannot shut our eyes to the fact that, although the Dublin show may be over before that at Manchester starts, it is inevitable that one must damage the other. There are firms who if they go to Manchester will refrain from going to Dublin; and there are firms who with a display running over months in Dublin will feel indisposed to go to Manchester. It is too great a tax upon exhibitors. Expense and time have to be considered by them. The only thing for the moment is to hope that the decision of the Committee of the Manchester Institution will not have any derogatory effect; but the hope is not unmixed with fear. Dublin, it must be conceded, has first claim; and, moreover, it is remembered that there was no hint of the Manchester Exhibition falling in the same year when the Institution of Gas Engineers determined, on account of the Irish Exhibition, to hold their annual meeting in Dublin next year. However, the Manchester Institution plans do not comprehend anything of a very ambitious nature. They desire their exhibition to be, while comprehensive, educative for the inhabitants of the thickly populated district within a twenty-five mile radius from the centre of Manchester, which means that the utilization of gas for private, public, and industrial purposes is, rather than the manufacture, to take the foremost place. Regarding lectures and demonstrations, so far as they refer to the manifold trade uses of gas in the district, they should, as much as possible, be delivered by men of practical experience in those trades. Cookery and popular lectures on the domestic uses of gas also fall within the scheme.

Gas Matters at Nottingham.

Evidently the gas question at Nottingham is just as much in the public mind now as was the case weeks ago, if one can judge by the length and number of the speeches that were delivered at the last meeting of the City Council. On the face of it, the point then discussed did not appear to warrant the great amount of attention that was devoted to it. A Superintendent is, it seems, required for the Eastcroft Gas-Works; and the Gas Committee are desirous of filling the appointment before the arrival of the heavy winter season. There is, however, as is well known, a Special Investigation Committee at present at work; and this was where the trouble came in. The resolution appointing the Special Com mittee gave them "full powers to terminate the service and to appoint any official or officials" in connection with the gas undertaking; and it was argued by the member who introduced the subject at last week's Council meeting that the meaning of this was that, while the investigation was proceeding, the Gas Committee themselves ought not to have power to appoint any officials. He moved, therefore, that when applications for the position of Superintendent at Eastcroft were received in response to the advertisement, the appointment should be made by the Gas Committee, subject to the approval of the Special Investigation Committee; and the substance of this proposal was ultimately agreed to without a dissentient, though one or two of the members did not vote. The argument advanced by the Chairman of the Gas Committee (who evidently felt somewhat strongly on the matter) was that though the Special Committee had been given power to appoint and discharge, nothing was stated to the effect that his own Committee had not also the same power. This may be so; but anyway the conclusion come to by the Council seems to get over the difficulty. Some disappointment was expressed at the apparently slow progress of the Special Committee in the inquiry they have undertaken; but in reply to a question, Sir John Turney remarked that the Committee hoped early next month to say something.

Gas Accumulations in Electric Lighting Chambers.

The accident we chronicled at Hastings a fortnight since—whereby a baby was killed by the cover of an electric lighting chamber, which had been blown into the air by an explosion produced by an accumulation of gas and the playing with matches by boys—should bring to a head the question as to the necessity of constructing electric cable conduits and inspection chambers in a manner that is impervious to gas, and in a manner that provides adequate ventilation. This Hastings case is another illustration of the great danger that lurks about unventilated underground places giving harbourage to accidentally escaping gas (in this case the gas came from a previously undetected fracture in a gas-pipe); and the provision of such places ought to be prohibited, and sound structure and ventilation be made compulsory. The unfortunate thing is that there are so many badly constructed electricity distribution systems in the country that are equally dangerous as the one at Hastings has proved to be, and which cannot now, without great expense, be put into a condition impenetrable by gas. In such cases,

however, it would not be an engineering impossibility to now provide an efficient system of ventilation; and as Mr. C. F. Botley, the Assistant Gas Engineer at Hastings, urged at the inquest on the baby, there might also be greater co-operation between electricity and gas suppliers, with more frequent inspections. It is not a comfortable thing to have charged to one's account liability and responsibility for destruction to life and property which simple remedies would avert. Bearing upon this subject, subsequent to the Hastings accident came the report of an electric cable fusing at Blackburn, resulting in two explosions.

Ora pro Nobis.

The "Electrician" has commenced an industrial supplement; and one of its features is to be "Electricity Supply and its Leading Exponents." The leading exponent who is the subject of the word-sketch in the first number is Mr. Frank Bailey, the Chief Engineer to the City of London Electric Lighting Company. The last paragraph commences with these ominous words: "Under Mr. Bailey's able generalship, an active campaign is being carried on against the gas interest in the City; and from his photometric laboratory, we shall yet see emanate lamps which will again wrest the lighting of the City thoroughfares from the hands of the Gas Company." So confidently is the prophecy made, that it ought not to be difficult to say how long we are to wait for its consummation.

A Protest from Mr. Bailey or His Company.

For years the City of London Electric Lighting Company did not bestir themselves to better the disgraceful and expensive lighting of the main streets of the City; but obsolete arc lamps were allowed to remain, and still remain. Mr. Bailey's enthusiasm for the improvement of the street lighting seems to have originated, if outward evidence is the revelation of what has, or has not, gone on behind the scenes, with the clearing out of electric arc lamps from Queen Victoria Steet, Fleet Street, and other parts; and so intensely interested is he now in this subject, that it is very irritating to him to see references to what has happened in the City streets. Sir George Livesey in his recent letter to "The Times," on the question of the lighting of Oxford Street (which letter was noticed in the "Electric Lighting Memoranda" last week), ventured the opinion that the City authorities had evinced a proper impartiality in connection with this street-lighting question. "The Times" has since published a letter from the City of London Electric Lighting Company; but as the personal pronoun "I" is used in it, it may perhaps be taken that Mr. Bailey had something to do with inditing it. The concluding part of the letter is as follows:—

> Sir George Livesey is apparently unaware of the fact that the City of London Electric Lighting Company has offered, at its own expense, to demonstrate the improvements made in the electric street lighting; and, until such demonstration be given by permission of the Corporation, Sir George Livesey's statement, that in the City of London the respective merits of electricity and gas are impartially considered, is not correct. The existing type of arc lamp in the streets of the City of London was erected some fifteen years ago; and therefore at present the consideration is between the most modern and improved gas-lamps placed experimentally in one or two streets by the Corporation and obsolete electric arc lamps of a type specified in contracts dated 1891.

The Company and Mr. Bailey have to be constantly making some damaging omissions as to their idleness in this connection in the past. Their first offer of a demonstration, to the best of our belief, came not before, but after the high-pressure incandescent gas-lamps were decided upon for Queen Victoria Street. But in considering the question of impartiality, what about the demonstration with flame arcs at either end of the street?

The Notes in the "Engineering Supplement."

The glaring partiality of the writer of notes in the Engineering Supplement of "The Times" for electric lighting and opposition to gas lighting (which also supplied topic in our "Electric Lighting Memoranda" last week) has apparently drawn protest from several correspondents; for in last Wednesday's Supplement a paragraph appeared stating that "a number of communications have reached us on the subject of the note on street lighting appearing in our last issue. One correspondent accuses us of treating Sir George Livesey's communication in a derisive spirit, in which he is mistaken." From this, one is inclined to think the writer of the offending note is not altogether clear as to the meaning of a "derisive spirit." Another correspondent of our daily contemporary is Mr. Langton Cole; and he observes: "The compressed gas lighting on London Bridge seems to me to be more satisfactory than any electric system now in use; and I have never seen there (though I cross the bridge daily) the 'sickly glare of the disintegrating gas mantle.'" The writer of the paragraph, either through ignorance or belittling intention, remarks: "Mr. Langton Cole is probably referring to the Kitson light." London Bridge is lighted by an ordinary high-pressure gas system, and not the Kitson light. Does "The Times" man know the difference between the Keith light and the Kitson? If not, it is time that he did, so as to prevent confusing comments.

"Persuasion" in South Wales.

There have recently been some—from the readers' point of view—extremely diverting accounts of Trade Union methods in South Wales, where a determined effort has been made to bring into the fold of the Miners' Federation those men who, so long as they were allowed to exercise any free will in the matter, preferred for one reason or another to remain outside of it. The trouble has been hanging over the district concerned for some time past; and as threats were not sufficient, stronger steps were finally resorted to by the Unionists. Whether this action was forced upon them by increasing defections from their ranks, or whether the precise moment was regarded (from considerations as to the condition of trade) as being a particularly opportune one for getting their own way, does not greatly matter. It may have been "a little of both," though the wisdom, from a general Trade Union standpoint, of giving such a display of "peaceful persuasion" just when the country is so much exercised over the Trades Disputes Bill, is decidedly open to question. Anyway, the matter was brought to a head, and a nice little revelation it has been. The result is a triumph from the Federation point of view—for the time being, at all events. Whether anything more than temporary success can be reasonably expected from coercion of this character, may be open to doubt; but that does not affect the existing position of affairs. A feature of the present strikes and disturbances has been the assertion in various quarters that everything has been done "good humouredly" and in a spirit of "frolic." This, no doubt, has been said to try and make the occurrences accord to some extent with the general idea of what constitutes "peaceful persuasion;" but most unbiassed persons reading the reports sent from the Rhymney and Maesteg districts will agree that intimidation has been developed on a large scale. Riding a man in a wheelbarrow and tipping him out every few yards (as is stated to have been done), is, for instance, possibly a very different thing when viewed from the two points of the wheelers and the wheeled. Another argument is that those connected with the acts of "persuasion" have been chiefly miners' wives. But even a crowd of a few hundred women might be calculated to "convince" a non-Unionist "against his will." There may have been, and indeed it seems that there were, very few actual scenes of violence; but in one way or another the recalcitrant ones were forced to join the Union, and the plain word for that is coercion, not persuasion. The same means that have been adopted to get the men into the Federation will be employed to keep them there; for it is announced that the men are to show their Federation cards every two months, and anyone who cannot produce his card "will be expected to return home." The non-Unionists have all been gathered in; and thus the Federation are sure, for the present at least, of their entrance fees, general levies, parliamentary contributions, &c. The price which the men are called upon to pay is, however, more than this; for they must certainly sacrifice the right to think and act for themselves.

We have received from the Board of Agriculture a copy of a Memoir on "The Water Supply (from Underground Sources) of the East Riding of Yorkshire, together with the Neighbouring Portions of the Vales of York and Pickering, with Records of Sinkings and Borings," by Mr. C. Fox-Strangways, F.G.S., with contributions by Dr. H. R. Mill. The Memoir contains an outline of the geology of the area covered, with special reference to the water-bearing strata. It includes records of all known sinkings and borings, together with analyses of waters and a bibliography; and there is also a section on the rainfall, with a coloured map. The price of the Memoir is 3s.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 792.)

THE Stock Markets during the past week were again under the influence of the monetary situation, though the settlement also helped to restrict business. The advance in the bank rate to 4 per cent. stiffened the rate for the day-to-day money, which has become less plentiful; while the rate for three months bills has been well up to Bank rate. Nearly all sections of the Stock Exchange have been affected by the heavy withdrawals of gold from the Bank of England—gilt-edged stocks being depressed, as well as more speculative descriptions; Consols at one time touching 85⅞, from which point there was a recovery of ¾. Gas stocks, however, stood their ground well, and were not affected by the fall of the premier stock. Though business was again on a limited scale, rather more activity was shown after the settlement was concluded; and we have to record a rise in Gaslight and Coke maximum, Imperial Continental, South Suburban ordinary, Oriental, River Plate, Commercial ordinary, and Newcastle debentures. The dealings in Gaslight and Coke ordinary were, as usual, fairly numerous; business having been done at 100¼, or an advance of ½ in the price of the stock, which, however, was not maintained to the close. Most of the markings were between 99½ and 100. The 3½ per cent. maximum was also in some request; and the price advanced to 88-90—dealings being recorded at 88, 88½, 89, and 89½. Business was also done in the 4 per cent. stock at 109; and in the debentures at 86¾ and 87. Some inquiry prevailed for South Metropolitan; dealings being recorded at 132½, 132½, 133½, and 134. Commercial issues were neglected, though a little business was done in the ordinary at 113½, special bargains in the 3½ per cent. stock at 110½, and in the debentures at 84½. In the Suburban and Provincial group, West Ham ordinary changed hands at 105, Brighton "A" at 171, ditto ordinary at 235½ and 236½, while business was done in British at 41⅞ and 42. In the Continental Companies, a further advance to 188-191 is recorded in Imperial Continental; business being done at 188½, 189½, 190, 190¾, and 191. Continental Union was also in request, though dealings were not so numerous. The stock changed hands at 125⅜ and 124¾. European was dealt in at 24, Tuscan at 10 11/16, and Malta at 4 7/16 and 4½. As regards the undertakings in the remoter world, there has not been much doing. Bombay changed hands at 6 15/16; and business was done in Cape Town ordinary at 15⅛ and 15¼, and in the debentures at 88½. A little inquiry prevailed for Buenos Ayres debentures at 97, and Metropolitan of Melbourne debentures at 102¾. Monte Video shares changed hands at 11½ and 11⅝, River Plate at 13 1/16, and San Paulo at 14⅝. Primitivas were more active at 6 15/16, 7, 7 1/16, and 7 7/16, while the preference sold at 5 3/16.

The closing prices are shown in our Stock and Share List on page 792.

ELECTRIC LIGHTING MEMORANDA.

Queer Methods of Charging at Wigan—Assisted Wiring and Hiring at Kettering and Wolverhampton—Financial Aspects of the Electricity Business at Sleaford.

THE amazing methods that many municipalities adopt in fixing their charges for electricity (this was one of the subjects of last week's "Memoranda") was illustrated at a recent meeting of the Wigan Borough Council, when worthy aldermen and councillors got involved in intricate and heated argument on the question. It arose upon a motion by Mr. Fletcher, that existing contracts should be cancelled for the supply of electricity to private individuals for motor or other purposes at less than 1d. per unit. A contract with Messrs. Ashton Bros. at 0·75d. per unit is the objective of the campaign at Wigan against low and unremunerative charges. The absurdity of the price is declared by three things: The generating costs in 1905 amounted to 0·78d. (0·81d. was quoted in the Council); the Tramways Committee are charged 1½d. per unit, or double as much as Ashton Bros.; and there is a proposal to spend £29,000 on extending the works, because other people cannot at present be supplied who are prepared to pay a higher (and profit-bearing) price than the firm named. Complication is further created by the fact that, while Ashton Bros. are only paying 0·75d. per unit, the Tramways Committee have, according to Mr. Fletcher, entered into an engagement to pay the South Lancashire Electric Traction and Power Company 1½d. per unit for any electricity they may require of them. There is no attempt on the part of the Electricity Committee to reconcile the charges to Ashton Bros. and to the Tramways Committee, who direct a public service, and ought assuredly to be put—on that account, and also because of the extent of their custom—on the most favoured remunerative terms. "Remunerative terms" differ in every town. For instance, the Electrical Engineer of Cheltenham has reported that the price charged for traction there —1·6d. per unit—leaves little margin. Electricity, however, is a thing that cannot be compared with anything else, says one sapient councillor of Wigan; but it is beyond him or other councillors to explain why it is not like all other commodities, and why it should not be subject to the conventional methods of charging.

Mr. Wood, a member of the Wigan Electricity Committee, surpassed himself in his defence of the 0·75d. contract, but his defence is a case for the impropriety of the charge to the public tramways. He has heard Mr. Wordingham giving evidence at Westminster; and it has impressed him as being a commonsense method of determining charges. The maximum demand of a consumer is taken as the basis of the standing charges applying to his case. With a long-hour consumer, those standing charges, spread over his consumption, become less than in the case of a man whose demand is concentrated into (say) an hour or two. Therefore, argues Mr. Wood, the Committee can afford to supply that long-hour consumer at a lower cost than the short-hour one. Then how is it the Tramways Committee are charged double the price that Ashton Bros. pay? The art of reasoning is not so fully developed as it might be in certain quarters in the Wigan Council, otherwise Mr. Wood would not have set himself to showing positively that the tramways were being unfairly treated, having regard to the price paid by Ashton Bros. But this figure does not pay even the average generating costs; so that it would be interesting to see where the proportion of the rent, rates, and taxes, management, insurance and office charges, and sinking fund and interest expenses come in. Perhaps the Borough Electrical Engineer might be requested to furnish an analysis of the charges comprised in the 0·75d. The microscopic nature of the items would not appal those who care for these things. If the principle that Mr. Wood trotted out, and which nobody in the Council appeared to understand, were applied (say) to whisky—and why should it not be?—the vendor ought to supply his heavy whisky-drinking customers at a less price than his temperate ones, because the standing charges on the production of the whisky would, spread over the consumption, be of a very attenuated order. In the cause of temperance, we hope that the same principle will not be applied, as if the consumption increased sufficiently, the "standing charges" on production would become so shadowy as to be absolutely invisible to the naked eye, and so every drink would become cheaper. If the same rule governed the charges to large and small consumers for lighting purposes—why should it not, if it is right in the case of Ashton Bros.?—there would be a fine old muddle in respect of charges. As a matter of fact, both in power and lighting, the small long-hour consumer should get his supply cheaper than the heavy and large consumer whose load only lasts half the time. There is something not altogether rational about the principle. One thing that is overlooked by Councillor Wood in connection with his adopted argument, is that the larger the consumers, the greater the wear and tear they are responsible for on the plant. That is a flaw in the principle which requires looking into. We believe in the cultivation of day loads, but at reasonable prices. The charge to Ashton Bros. is not reasonable, if the 1½d. to the Tramways Department is a fair one.

There is great divergence of opinion among local authorities over the hiring and wiring business. Some are of opinion that it is a good thing for an Electricity Department; others, on investigation and trial, have come to the conclusion that the game is not worth the candle, and that it involves a great deal of risk; and others—the more conscientious ones—are of opinion that it is a system that is fraught with injustice to the most lucrative class of consumers. In the course of the recent discussion in the Wigan Borough Council, it was stated that the Pemberton District Council had almost been landed in bankruptcy by their free-wiring scheme; a fortnight ago, it was shown that the assisted wiring and fitting business had produced a loss of £330 for the West Bromwich Electricity Department in the last financial year; and the Brighton Corporation, after inquiring thoroughly into the matter previous to entering into the business themselves, came to the conclusion that there was nothing in it, and refrained from going further with the proposition. Kettering, on the other hand, claims that it has, after a year's working, been a remarkable success in their case; and they are spending capital heavily on it. But there is likely to be a great awakening for them later on, and a big pile of unproductive and depreciating capital to burden the department. The Council are going into the business with imprudent haste and optimism. And it is the prepayment gas-meter that is urging them on; for gas is not expensive for a town the size of Kettering. It is a pity that, when the Council obtained power a couple of years ago to spend money in this way, the same conditions were not applied to them as have since been imposed in the case of the Metropolitan Borough Councils, to ensure that the wiring and hiring business is self-supporting. But they were not; and the first year there is a deficiency in respect of the loan of £185, and we are not at all convinced that this deficiency comprises all the charges that really appertain to the loan. It may be taken, however, that the Department have already obtained the best consumers that the system will tempt.

The Council's borrowing powers for electric lines, fittings, motors, &c., amount to £20,000; a loan of £4000, carrying 4 per cent. interest, has been spent in eighteen months; and a loan for a like amount is now going to be raised. The period of repayment is limited to ten years. Under the annuity system of repayment, this makes an annual payment of £12 6s. 6d. per cent. What prospect is there of the loss increasing? In the first place, the business is a novel one for Kettering; and there is the risk of the novelty wearing off. Under the rental agreement (as distinct from hire purchase), the consumer only guarantees the payment of not less than three years' rental. At the end of the three years, it may well be expected that not a few will relinquish the doubtful privilege of being electricity consumers. Of the rental and hire

purchase terms, most sensible consumers will prefer the rental; seeing that, in the way of rental, they have only to pay, in sixteen or seventeen years, as much as they would have to pay in ten years under the hire-purchase scheme. And it may be taken for granted that before sixteen or seventeen years, the installation will require renewing. This the Department may as well have the pleasure of doing as the consumer. A cottage that costs about £5 to fit up is only charged a rental of 1s. 6d. per quarter; or 3s. 2d. on hire-purchase. For a house costing about £12 to fit up 3s. 7d. per quarter is paid; and on hire-purchase, 7s. 6d. Therefore, from rental, it will take just about seventeen years for the Council to get the cost back, without taking interest into account. To make the scheme financially sound, the house costing £5 to fit up ought to pay £6 3s. 4d. in ten years, and the house costing £12 to fit up about £14 16s., without allowing anything for the risk of consumers having had enough at the end of three years, or for replacements within the decade. We do not know whether renewal of lamps is included in the rental; but this we do know, that those who are on this system are much favoured in comparison with the ordinary consumers. If the whole of the business was conducted on these losing lines, the electrical department would look much worse than it does now. The best thing we can advise the householders in the town to do, if they are resolved to go in for the expensive method of lighting by electricity, is to have their houses fitted on the terms offered by the rental system, and not to pay for it themselves. It is a safe plan; for without any capital expenditure on their own part, there is always an escape from the expensive lighting at the end of three years. Of course, it is argued that this is a business-developing device. It has the appearance of becoming, if it is not already so, a very expensive one; and the loss on it is a general charge on the department, or on the rates. It is, in short, a scheme for giving a householder a three years' trial of electricity at other people's risk and cost.

Turning to the assisted wiring scheme at Wolverhampton, the Electricity Committee there are bent on getting their money back as quickly as possible; the charges being on a much higher scale than those at Kettering. In Wolverhampton, it is proposed to charge 2¼d. per lamp per quarter for the wiring. As the wiring is not of much use without fittings, the thoughtful department are prepared to supply the fittings also at a further charge of 2¼d. per lamp, the type of which is not stated. That is to say, the rental amounts to a total of 4½d. per lamp per quarter; so that the cottage consumer, to be on a level with his compeers at Kettering in the matter of rental, could only have four lamps for 1s. 6d. per quarter, and the resident in the house requiring £12 to fit it up, only about ten lamps for 3s. 7d. per quarter. Wolverhampton is not nearly so generous as Kettering; but perhaps the Committee want to see their money back within a reasonable period. However, the tenant of a house such as would be inhabitated by the middle class could easily expend at Wolverhampton 10s. a quarter on his installation. And if he decides upon hire-purchase, he has to pay the cost in three or five years, and 5 per cent. on the balance outstanding on each quarter day. At Wolverhampton, too, assistance is given in connection with the arc lamp and motor businesses. Motors are sold to consumers with only a small profit charged on cost price; or the customer can pay cash for wiring and fixing, and a yearly rent of 10 per cent. on the list price of the motors and accessories, or he can pay the cost of the whole installation in quarterly instalments over three, five, or ten years, with interest at the rate of 5 per cent. on the outstanding balance each quarter day.

A general review of municipal electricity accounts appeared a fortnight ago; but since then an opportunity has been taken to look into the accounts of a sample or two of minor undertakings that struggle hard to maintain a genteel appearance on a very slender purse. The Sleaford accounts are typical. By acute perseverance, the working expenditure and capital charges there are made—assuming that sundry debtors pay up—to accommodate themselves snugly (on paper) to the receipts. We cannot go very critically into the accounts. That could be better done if, in addition to the financial part of the business, there were figures given as to the units of electricity generated and sold for private and public purposes. There are, however, a few items to which attention may be drawn as being illustrative of the way in which local authorities in small towns such as Sleaford bamboozle the ratepayers in the struggle to show on the surface a clean balance-sheet. The total receipts for electricity only amounted to £1190; and of this the ratepayers had to contribute £472 for street lighting formerly done by the Gas Company for £275, including all charges. Now when this £472 is deducted from the £1190, it is seen that the private business only exceeds the public lighting by £245. Truly not an encouraging showing! Were the figures as to the relative consumption of electricity for private and public purposes available, we should be much astonished if they did not show, and the ratepayers would perhaps be astonished if they did, that the consumption of electricity for public lighting purposes exceeds that of the private business. On the other side of the account, the expenditure on public lighting is only entered as £75 15s. 8d. The figure has the appearance of having been pared down very closely. The capital account stands at £10,676; but—let fully assessed ratepayers note—the concern is only charged with £5 6s. for rates and taxes! Why should not this business, as do all other businesses in the town, bear its fair share of the town's burdens? Salaries and management expenses only amount to £114; and all that can be afforded for general establishment charges is £4 13s. 8d. It is feared that there has been a grand muddling away of charges somewhere. We cannot detect where the clerical charges come in. If they are part of the item of £114 for salaries, the Engineer had better shake the dust of the electricity station from off his feet, and seek more remunerative employment elsewhere. There is much to be explained as to how things are so economically managed at Sleaford. In the general statement of the town's receipts and expenditure, there is an item "Electric lighting £1057 16s. 1d." among the expenditure. What this amount represents, there is nothing to show. Perhaps it covers a few of the sins of omission on the expenditure side of the revenue account of the electricity undertaking. On the receipt side of the town's general statement, credit is not taken for the £472 15s. for public lighting. Why not? Nothing is put by for depreciation or reserve. The balance of profit, before paying interest and the instalment of principal, is only £312. This is a lively condition of affairs for an undertaking with a capital of £10,676, and nothing put by for the future. No one will covet the prospects of the ratepayers of Sleaford in connection with this speculation.

WORKMEN'S COMPENSATION STATISTICS.

In the midst of the discussion over the changes in the law relating to workmen's compensation, a little time may be spared for taking note, as far as possible, of the latest results of the Acts which have for the past good many years been in force. The necessary figures and particulars to enable this to be done are contained in the Home Office report on proceedings during 1905 under the Workmen's Compensation Acts and the Employers' Liability Act, which was issued on Friday last. Of course, the statistics are not really complete, because the Acts themselves do not contain any provisions for the making of returns to show the working of the systems which they established; and thus the sources of information are limited to the cases which come before the County Courts, some few in which memoranda recording agreements or private awards are registered, actions carried to appeal, official references to Medical Referees, certified schemes of compensation, and certain information as to the cost incurred by railway companies. In the great majority of cases, however, compensation is settled by agreement, no memorandum is registered, and no official information therefore is available. Even in cases of death, the report states, not more than 27 per cent. came before the Courts; and this figure, too, contains a good many finally settled out of Court. As regards injuries which result in disablement for more than a fortnight, it is calculated that less than 1 per cent. of the total cases in which compensation is payable are taken into Court. Before dealing with the figures, it may be mentioned that, as in previous years, they (unless otherwise stated) refer only to England and Wales. There is a separate section of the report devoted to Scotland, and also one for Ireland.

The first table deals with arbitrations in County Courts; and it shows that the number of cases under the Workmen's Compensation Acts actually dealt with in the past year by County Court Judges and Arbitrators was 1754. This is the largest number yet recorded, and compares with 1730 in the preceding twelve months. Of these 1482 were decided by Judges, and only 27 by a Special Arbitrator; while 245 cases were settled by the acceptance of money paid into Court. It should, however, be pointed out that in addition to the cases actually dealt with in Court, there were 715 which were withdrawn, settled out of Court, or otherwise disposed of in such a way as not to enable the officials of the Court to definitely state the result. This makes the total altogether of cases taken into Court 2469, as compared with 2435 in the preceding year. Of the claims for compensation which were finally settled in 1905 within the cognizance of the Courts, the great majority of the decisions were in favour of the applicant—1242, as against 264 for the respondent. The proportion of instances in which the applicant was successful was thus 82 per cent.—the same as in the preceding year. The number of cases in which compensation was awarded on account of death was substantially greater in 1905 than in the preceding six years during which the Compensation Act has been in force. There were 538 instances, compared with 452 in 1904; and in all except one of them the deceased left dependants. Seeing that, where persons wholly dependent are left the compensation cannot be less than £150 and may be as much as £300, and that in cases in which partial dependants remain the compensation has to be proportionate to the injury sustained by them, the total amount awarded in respect of fatalities on the present occasion exhibits a very large increase. It is £101,983, as against £80,231 in 1904, and £37,904 in 1899 (the first complete year during which the Act was in operation); the average amount awarded—£189 11s. 3d.—being also slightly greater than in any of the six preceding years. Of the 538 cases in 1905, there were 117 in which sums of less than £150 were awarded.

Turning to the cases of injury, the assignment of a weekly amount was by far the more general method adopted; there being 116 instances recorded of the payment of a lump sum, and 587 of a weekly sum. The average of the lump sum payments was £35 1s. 6d., which, again, is a little more than the preceding year's figure of £34 12s. 8d. In reference to weekly payments, it is not possible, except in a few cases, to state the length of time over

which the amount has been payable, so that no complete calculation as to the capitalized value of the grants can possibly be given. The average weekly payments for the 337 cases of total incapacity—that is, 11s. 10d.—and the 250 cases of partial incapacity—10s. 7d.—were both practically the same as in the preceding twelve months.

As some guide to the period over which the payments made under the Act might be taken to extend, the report mentions that in the case of mutual schemes of co-operation certified by the Chief Registrar of Friendly Societies, it is found that the average duration of cases of incapacity lasting more than a fortnight (excluding those which lasted over six months) was 5·2 weeks; but at the same time it is pointed out that the average duration of contested cases would doubtless be higher. There are seven heads of employment included in the Acts of 1897 and 1900—railway, factory, mine, quarry, engineering work, building, and agriculture. Of these, the heading of "factory" embraces by far the largest number of cases—1093 of the total of 2469. It has already been stated that in the great majority of cases settled by agreement no record remains of the terms arrived at, but that in some instances memoranda containing this information are registered in the County Court. The second table in the report deals with these; and it shows that 4244 cases were settled by agreement, 62 by a Committee representative of employers and employed, and 11 by an agreed Arbitrator. The gross total of 4317 cases thus registered, though still representing, of course, only a very small proportion of the agreements under the Acts, is a considerable increase on the figures of the preceding years. In these agreed cases the average compensation awarded last year to dependants in the event of death was £164 0s. 9d.; while the weekly payments in the 1913 instances of incapacity in which this method of compensation was decided upon averaged 13s.—the average sum handed over in the 1420 cases where a lump sum was paid being £40 1s. 8d.

Cases under the Employers' Liability Act are dealt with in the third table, as nearly as possible on the same lines as the statistics relating to the Workmen's Compensation Acts in the first table. As remarked in the report, the task is, however, a simpler one—first, because all cases, except those removed to the High Court, are decided by the County Court (there are no Arbitrators), and, secondly, because the damages awarded can always be stated as a lump sum. The total number of actions under the Employers' Liability Act last year—481—shows a considerable falling off as compared with the 598 cases in 1904. The results of those dealt with in the present report were: Judgment for the plaintiff, 130; judgment for the defendant, 77; otherwise disposed of, 274. The amount of damages awarded was £8479 3s. 8d. Of the total number of 481 cases, in 36, though the proceedings were originally taken under the Employers' Liability Act, the question of compensation was actually determined under the Workmen's Compensation Act, in accordance with the provisions contained therein. It is interesting to compare the financial results of actions taken under the respective statutes. The average amount of damages in case of death recovered under the Employers' Liability Act last year was £136 14s. 4d.; while the average compensation awarded by County Courts in similar cases under the Workmen's Compensation Acts was £189 11s. 3d. There is thus (from the workman's point of view) a very considerable balance in favour of the newer provisions dealing with compensation; and the same remark holds good with regard to the cost of procedure—the average amount of Solicitor's costs last year under the Employers' Liability Act being £24 16s. 10d., and under the Workmen's Compensation Acts £14 1s. 9d. In spite of these advantages, however, it is remarked that the higher proportion of cases in the Metropolis that are brought under the Employers' Liability Act is still marked.

It seems somewhat curious (in view of the large variety of points already decided by the Judges on appeal) that there should last year have been a large increase in the number of cases under the Workmen's Compensation Acts carried to the Court of Appeal. Nevertheless, it is a fact that 97 (or nearly 4 per cent.) of the cases that came before the County Courts did go to appeal, compared with 34 the previous year. Of these, 42 (of which 12 were successful) were appeals by workmen, and 55 (of which 13 were successful) by employers. There were five appeals to the House of Lords (as against two in 1904); the employers being the appellants in four cases.

In Scotland, there were last year, proportionate to the population, fewer cases under the Workmen's Compensation Acts than in England—63·5 per million, as against 72·3; but Scotland still leads in the matter of litigation under the Employers' Liability Act—the proportion being 29·3 per million of population, compared with 14·1 in England. The average amount of compensation paid last year in Scotland in the event of death where dependants were left was £165 1s. 1d. in cases decided in the Sheriffs' Courts, and £209 16s. 1d. in those of which memoranda were registered. In cases of incapacity, the lump sum figures were respectively £9 17s. and £39 3s. 5d.; and in those of weekly payment, 10s. 7d. and 13s. 5d. In Ireland, the average amount of compensation paid in 1905 in the event of death where dependants were left was £111 5s. 5d. in cases decided in the County Courts, and £102 4s. 7d. in those in which memoranda were registered. In cases of incapacity, the respective figures were: Lump sums, £16 9s. 5d. and £36 1s.; and weekly payments, 7s. 6d. and 10s. 11d.

PERSONAL.

Mr. R. J. LUKEV, the Secretary of the Australian Gaslight Company, Sydney, New South Wales, who has been in England, on leave of absence, since June last, leaves to-day—*viâ* Paris and Marseilles—on his return to Australia.

Among the passengers who have booked berths for New York on board the "Oceanic," due to sail on the 26th inst., is Mr. T. G. MARSH, of Manchester. Pressure of business this side will prevent Mr. Marsh from remaining long in America; and, according to present arrangements, he will be back in London about the middle of November. He will, however, be in the States at the time of the annual meeting of the American Gaslight Association at Chicago.

At the Church of Holy Trinity, Plymouth, last Wednesday, the marriage took place of Mr. WILLIAM WALTER TOWNSEND, eldest son of Mr. H. Townsend, of Wakefield, to Miss Nellie Banks Westcott, daughter of Mr. John Westcott, shipowner, of Plymouth. Mr. Townsend has been occupying the position of Deputy-Manager of the Warrington Gas-Works; and his appointment to succeed Mr. W. Parlby in the management of the Hereford Gas-Works was recently announced in the "JOURNAL."

Mr. JOHN SHIRESS WILL, K.C., who is known to every reader of the "JOURNAL" in connection with "Michael and Will on the Law Relating to Gas and Water," has been appointed to succeed the late Judge Bowen Rowlands as Judge of the County Courts on Circuit No. 7, which includes Altrincham, Birkenhead, Northwich, Runcorn, Leigh, and Warrington. He was called to the Bar by the Middle Temple in 1864, and went the South-Eastern Circuit, also practising at the Parliamentary Bar; taking silk in 1883 and becoming a Bencher of his Inn in 1888. From 1885 to 1896, he sat as Liberal Member for the Montrose Burghs.

Mr. W. G. QUICKE, who has severed his connection with the Perth (W.A.) Gas Company, and started business as a Mechanical and Consulting Engineer, did good work during the five years that he occupied the position of Gas Engineer to the Company. The increase in the gas sold over this period amounted to more than 46 per cent.; and at the same time the street-lamps were converted. The 411 existing lanterns were altered to Mr. Quicke's designs, so as to adapt them to incandescent burners; and this improvement led to an increase in the number of lamps, until this year the figure of 1044 has been reached. Mr. Quicke increased the make of gas per ton of coal carbonized from 10,322 to 10,636 cubic feet, at the same time reducing the unaccounted-for gas from just under 14 per cent. to about 7 per cent. The Company commenced the fitting up of Lucas lamps in 1903; and by this year 470 have been fixed. The net profit of the Company for the half year ending May 31, 1901, was £5982; that for the half year to May 31, 1906, was £13,548. For the former period the dividend was 1s. per share on 99,900 shares; and for the latter, 2s. per share on 125,000 shares.

OBITUARY.

The Stafford Town Council have unanimously passed a resolution recording their deep regret at the death of Mr. MATTHEW FOLLIOTT BLAKISTON, who for more than 31 years held with distinction the office of Town Clerk. During this long period, the borough made marked progress; and in the various important schemes which were carried through, Mr. Blakiston took a prominent and most active part. Notably among these was obtaining, in 1876, an Act of Parliament for the extension of the borough, the establishment of a water supply, and the purchase of the gas-works.

The "Sarco" Automatic CO_2 Recorder.

Visitors to the Earl's Court Gas Exhibition will probably remember seeing on the stand of Messrs. Samuel Cutler and Sons the ingenious apparatus then known as the "Ados" automatic CO_2 recorder; and a reference to it appeared at the time in our Exhibition number. In order that all their specialities may be united under one common trade designation, Messrs. Sanders, Rehders and Co., of No. 108, Fenchurch Street, E.C., inform us that the recorder will for the future be styled the "Sarco." Those engineers who desire to know more about how to obtain a reliable and minute control of the results of combustion in furnaces, by means of a continuous analysis of the flue gases, and by determining the percentage of CO_2 they contain, can do so by obtaining a newly-issued pamphlet on the subject from the above-named firm, and also by inspecting, and making inquiries at, their stand at the Engineering and Machinery Exhibition at Olympia. In the introduction to the pamphlet, it is found that the problem of efficient combustion in the boiler-house is attacked from the standpoint of the average steam user, and carried through in a popular manner suited not only to the scientific engineer, but also to the manufacturer, who is equally anxious to save money. A list of the names of some of the users of the machine show how widely the recorder has already been adopted; among those who employ it being firms and others identified with the gas industry. The large adoption of the "Sarco" recorder is one of the best of testimonies to its service in producing fuel economy.

"BLENDING" PRODUCER GAS WITH COAL GAS.

By Harold G. Colman.

The publication of Mr. R. G. Shadbolt's patent specification relating to his proposal for mixing producer gas with coal gas, as described by him in his Presidential Address to the Eastern Counties Association of Gas Managers last year (see "Journal," Vol. CXI., p. 814), and the commendation recently bestowed on the method by Mr. R. Bruce Anderson in his Presidential Address to the Irish Association (*ante*, p. 438), have directed renewed attention to this matter; and some consideration of the results of such a process may be of interest at the present time.

The criticism has already been frequently made that the process is essentially nothing more than a variation of the ancient practice of drawing in the gases around the retorts by overrunning the exhauster. But while there is some degree of truth in this statement, it does not fairly represent Mr. Shadbolt's aims. The gases drawn into the retort by working at a higher vacuum are the actual gaseous products around them, and consist of inert waste gases, which have practically no calorific power, and therefore act solely as diluents, except in so far as they assist in retaining a certain quantity of hydrocarbon vapours which would otherwise have been carried away with the tar. Mr. Shadbolt, on the other hand, makes arrangements whereby the product drawn into the gas is a producer gas of good quality, which has itself a calorific power of 110 to 125 B.Th.U. gross, and is as effective in retaining hydrocarbon vapours as the same quantity of wholly inert waste gases; his idea apparently being to use this gas instead of employing blue water gas in the manner already tried elsewhere. He recognizes that the presence of a high percentage of nitrogen in the producer gas is a disadvantage, but appears to consider that this is more than counterbalanced by the much lower cost of production of the latter gas as compared with blue water gas.

In order to get a clearer idea of the result of such a process, it will be most convenient to consider the results which will follow in a particular instance; and in doing so only the calorific power of the gas will be considered, and not the illuminating power, as it will be generally conceded that, so far as the flat-flame burner is concerned, the process would be disadvantageous.

Let it be assumed, in the first place, that the coal carbonized in the ordinary way is giving a yield of 11,000 cubic feet per ton of gas having a calorific power of 570 B.Th.U. gross, and that to this is added 1000 cubic feet of good producer gas of the following composition:—

CO_2	= 5	per cent.
CO	= 25	,,
H	= 9	,,
CH_4	= 1	,,
N	= 60	,,

This would have a calorific power of about 120 B.Th.U. gross. The resulting mixture of gas would consist of 12,000 cubic feet having a calorific power of 532 B.Th.U. gross.

In addition, however, allowance must be made for the calorific power of the hydrocarbon vapours retained by the added producer gas, which would otherwise have been carried away by the tar. This cannot be given exactly. But from tests made with tars such as are produced from coal when a yield of 11,000 cubic feet per ton is being obtained, I think it may be taken as an outside figure that the vapour retained—*i.e.*, mainly benzene vapour—will not exceed 1 per cent. per volume of the producer gas added. In the case under consideration, this would amount to 10 cubic feet of vapour, the total calorific power of which would be 37,180 B.Th.U. gross. The addition of this amount of vapour to the above 12,000 cubic feet of gas would result in the production of 12,010 cubic feet of gas of 535 B.Th.U. gross. It will be seen therefore that the increased retention of hydrocarbon vapours has only a very small effect in increasing the calorific power of the mixture.

If the cost of the coal gas be taken at 1s. per 1000 cubic feet into the holder, and that of the producer gas at 0·75d. per 1000 cubic feet (this cost being mainly due to extra coke used in the producer), the resulting price of the mixed gas is 11d. per 1000 cubic feet. So that the saving in cost of production would only allow of a reduction of 1d. per 1000 cubic feet in the selling price. Taking an average selling price of 2s. 6d. per 1000, 1d. would be equivalent to a reduction of about 3 per cent., while the reduction in calorific power would be about 6 per cent.

But in addition to the calorific power, the flame temperature of the gas must be taken into consideration. Assuming that the 11,000 cubic feet of coal gas contained 5 per cent. of nitrogen, the addition of 1000 cubic feet of producer gas containing 60 per cent. of nitrogen would raise the quantity of the latter in the mixed gas to 9·6 per cent., or practically double. As the temperature of the flame is reduced by the presence of inert gas, the flame temperature of the "blended" gas, burned under the most favourable conditions, must be considerably lower than that of the unmixed coal gas burning under similar conditions; and though it is not possible without direct experiment to give exact figures as to the extent of such reduction, there is no doubt that this would be proportionately still greater than that of the calorific power.

Before, therefore, any such process as that proposed by Mr. Shadbolt can be recommended for adoption, it must be shown that, in spite of the fact that the reduction of calorific power and of flame temperature is proportionally greater than the reduction in price, there is nevertheless, in actual practice, a benefit to the consumer resulting from the process, and that under practical conditions he does in fact obtain as much or more light, heat, or power for the expenditure of the same amount of money as formerly.

Leaving out of consideration the diminishing class of flat-flame consumers, a gas undertaking has to supply gas which is simultaneously suitable for all the following purposes: Incandescent gas-burners, gas-fires, gas-cookers, and gas-engines; and it must be shown that the admixture of producer gas results in practical advantage for at least a majority of these uses. It is just on this most vital point that evidence in favour of the change is lacking. The only statements made by Mr. Shadbolt relate to incandescent burners, with reference to which he states that with the "blended" gas less trouble is obtained from sooty mantles, and that, judged by the eye, the incandescent burners at Grantham give a better illumination with that gas than with the unmixed coal gas of higher calorific power. Doubtless the lower quality of the "blended" gas renders the deposition of carbon on the mantles of less frequent occurrence than when richer gas is used. But this is usually the case with gas of lower quality; and it by no means follows that the introduction of producer gas is the best way of bringing about such lowering of quality. Nor, assuming the correctness of Mr. Shadbolt's visual comparison of the incandescent burners with both gases, does it follow that the better light is due solely to the reduced quality of the gas; but it is very likely that, as has been observed elsewhere, the improvement is simply due to the fact that, in the particular incandescent burners used, the adjustment of air and gas supplies, gas pressure, &c., were such as happened to be most suitable for the lower grade of gas, and that with a suitable adjustment of the burners equally good and better results would have been obtained with the higher grade gas.

To the consumer who uses his gas for engines, its relative value depends almost entirely on its calorific power; and his interests would therefore certainly not be served by any alteration in which the reduction in calorific power was proportionally greater than that of the cost of the gas. Consumers of gas for fires and cookers would be even worse off, as they depend for economy of working, not only on calorific power, but on flame temperature, especially where it is the radiant heat of the flame, or material in contact with the flame, which is utilized. The amount of such heat is very largely dependent on temperature; and this in the case of the "blended" gas will be reduced even more than the calorific power.

Taking all the facts into consideration, it seems to me that the step proposed by Mr. Shadbolt is a retrograde one, and would be contrary to the interests of the gas industry generally. The object of gas undertakings who have to supply gas capable of being used for one or all of the above purposes should be to get the maximum proportion of the energy of the coal used into the form of combustible gas. But while it is not necessary that such gas should have an exceptionally high calorific power, it is essential that it should consist as far as possible of combustible gases, and should contain a minimum of inert gases such as nitrogen. In practical working—owing to the use of porous retorts and the necessity of maintaining a pressure less than that of the atmosphere in a considerable proportion of the manufacturing plant—it is impossible to avoid the introduction of a certain quantity of nitrogen into the gas from the air and furnace gases, and some nitrogen is produced in the distillation of the coal. But every attempt should be made to keep the amount of such diluent nitrogen as low as is consistent with good working in every other respect.

The election is announced of Mr. William B. Bryan, the Chief Engineer to the Metropolitan Water Board, as President of the Junior Institution of Engineers for the ensuing session, in succession to Mr. Dugald Clerk.

We have received from George Newnes, Limited, Part XIV. (and last) of the "Technological and Scientific Dictionary" which has for some time been in course of publication by them, under the editorship of Mr. G. F. Goodchild, B.A., and Mr. C. F. Tweney. It extends from "warehouse" onwards. It contains in addition an appendix consisting of several pages of additional words, a list of contributors, a preface, and some corrections.

The transporter bridge which was inspected by the members of the Wales and Monmouthshire District Institution of Gas Engineers and Managers on the occasion of their visit to Newport last May, has since been completed; and the opening ceremony was performed last Wednesday by Viscount Tredegar. A luncheon followed; and then a toast list was gone through. Alderman Thomas Canning proposed "The Engineers"—M. Arnodin (the well-known French suspended bridge designer), Mr. R. H. Haynes (the Borough Engineer of Newport), and M. Kérihuel (the Resident Engineer). After making a few remarks in English, Alderman Canning addressed M. Arnodin in French, and that gentleman responded to the toast in the same language. The other toasts included the Contractor, Mr. Alfred Thorne, who was complimented upon the excellent manner in which he had carried out the work.

THE ENGINEERING AND MACHINERY EXHIBITION AT OLYMPIA.

Until Oct. 17, the huge floor space of Olympia will be occupied by exhibits of interest to every engineer, for no one has legitimate claim to the title who is not concerned in, and who has not a knowledge of, mechanical engineering. To be truthful, it must be said that, in greater part, the exhibition is typical of the middle group of mechanical production—if mechanical work can be classified into large, medium, and small sizes—and it does not affect to be more than typical. Completeness would require a space that no public building in London could provide, so vast has been the produce of engineering invention; so vast has been the application. Some lines of engineering industry are entirely unrepresented; others have only their fringes touched. But there is so much overlapping that there is interest for all, though there will, we venture to think, be some amount of disappointment that so much space has had to be let to useful, but common, friends of the ordinary daily commercial life, while it would be easy to name hundreds of inventions that would fittingly have found place in the show. But as we have said on a previous occasion, with engineering so specialized and classified, and each division capable of conducting an exhibition of its own, no one general exhibition could possibly be truly representative of its greatness.

The exhibition was opened on Saturday by Sir Alexander Binnie, the President of the Institution of Civil Engineers, who was accompanied by Sir W. H. White, K.C.B., &c., the President of the Exhibition, and the members of the Advisory Committee, among whom present were Mr. James W. Helps, representing the Institution of Gas Engineers, Mr. James Keith, and Mr. Walter T. Dunn, representing the Junior Institution of Engineers. Professors Unwin and Silvanus Thompson were noticed among the company; and Messrs. Smith and Bridges, the Organizing Managers, were in active evidence. A very few words from Sir Alexander Binnie sufficed to declare the exhibition open; and then a tour was made of the stands, which were well advanced for an opening day, though the electricians were backward in the supply of the necessary power for showing the machinery in motion, and there was no promise that any would be available until the evening.

There was subsequently an inaugural luncheon, with Sir W. H. White in the chair; and he was supported by a number of distinguished men in the engineering world. "Success to the Exhibition" was proposed by Sir Alexander Binnie; and he dilated on the educational and stimulative effects of exhibitions of this kind. A good point was made by him when he said that the true engineer lived not upon the expenditure that he could influence, but upon the savings he could effect. Sir William White, in responding, referred to the incessant work of Messrs. Smith and Bridges in promoting the exhibition; and he mentioned that some of the resulting revenue would go to the charitable funds of engineering. He also alluded to the fact that there had only recently been an exhibition of the work of the electrical industry; and also of that "older, and by no means extinct, industry of gas engineering." The electrical engineers present looked glum; the rest of the audience cheered. Nor did the electrical engineers look over pleasant when Sir William told how the machinery in the exhibition was ready for working, but the electrical power had not arrived for the opening. Sir William likened mechanical engineering to a sort of maid-of-all work to engineering. To whatever branch of engineering one looked, the very best engineers were, he said, those who began in mechanical workshops. In responding on behalf of the exhibitors, Mr. James Keith urged, both as an engineer and exhibitor, that what was now wanted in this country was not so much protection as equality of opportunity. The toast of "The Visitors" was proposed by Mr. Bennett H. Brough, the Secretary of the Iron and Steel Institute; and, in the course of a humorous speech, he referred to the appropriateness of having a Smith and Bridges identified with an engineering exhibition. Reply was made by no less a capable spokesman than Professor Silvanus Thompson, who urged that a no more interesting class could be invited to the exhibition than the engineering student; and he suggested that a Saturday should be named as a students' day.

Before dealing with a few of the exhibits, it may be mentioned that lectures, military bands, and a *café chantant* are among what may be called the "side shows" of the exhibition. Nine lectures have been arranged; two of them being by Mr. H. A. Humphrey on "Gas-Engines."

The Exhibits.

The central feature of the exhibition is Keith's patent electric water and air circulator, which has been lent to the exhibition authorities by the inventors and manufacturers, the James Keith and Blackman Company, Limited. Not only does the fountain perform the manifold duties of circulating, changing, humidifying, cleansing, cooling, and reinvigorating the atmosphere, but by a combination of coloured lamps, by which the water is lighted, a most pleasing and brilliant effect is produced, so that usefulness and novelty are combined in the highest sense.

The exhibition is not sectionized in any way; and therefore it is necessary to wander down the whole of the long ranges of stands, and be careful not to pass by side ones, in order not to miss any of the goods which may have special interest for the individual. Really the types of goods shown are seemingly of countless variety. In glorious confusion we find gas and steam engines, boilers, with circulators and economizers; boiler coverings by the Mica Company and other firms; suction gas plants on several stands; all kinds of lathes, milling, drilling, cutting, planing, and other modern workshop machines and appliances, pneumatic tools, castings of various kinds; metallic and other packings; lubricants; accessories for all kinds of mechanical work; pumps of different kinds; air-compressors by Messrs. W. H. Bailey and Co.; gearing; automatic lifts; and time and other recorders for workshops. The cocks, flanges, and valves of the Alexander Manufacturing Company and of Messrs. T. & E. Wannbacher will be observed; and the pipes and accessories of Messrs. Edward Le Bas and Co. and the Sheepbridge Coal and Iron Company will arrest the notice of gas and water engineers. In conjunction with them, the pipe-bending machines of Messrs. John Barker and Co. and the tapping and screwing machines of Messrs. Joshua Heap and Co. will receive attention. Flexible tubing, which is becoming of increasing service to the gas industry, is shown by the United Flexible Metallic Tubing Company, Limited, and Messrs. Simmonds Bros. The belting of the Gandy Belt Manufacturing Company, which has obtained such large success for its excellent qualities, will claim inspection. Interest has always been found in the exhibition models of the Temperley Transporter Company, and this occasion will not be an exception. The Stirling Boiler Company illustrate the system of construction of their boilers; and a good selection of the world-wide known productions—including the fans so common now in gas-works—of the Sturtevant Engineering Company are on their instructive stand. The numerous instruments, enabling perfection in scientific research and in many branches of practical work, of the Cambridge Scientific Instrument Company are on view.

Two working models of the "Sarco" automatic CO_2 recorder—this is an automatic analyzer and continuous recorder of boiler and other flue gases—are exhibited by Messrs. Sanders, Rehders, and Co. This firm have also on view an interesting selection of draught gauges and recorders, pressure-gauges and recorders for use in gas-works; and a special recorder for controlling the working of regenerative furnaces. The "Phœnix" speed and volumetric recorder is a useful instrument, which directly and automatically records on a chart the speed, in feet per second, and the volume of any gas or air passing through a pipe or channel of any size. These exhibits do not exhaust the interest to be found at the firm's stand.

Messrs. Tilley Bros., of Kingsland Road, N.E., are exhibiting examples of the various classes of pipe work that they undertake; and they also show specimens of gas lanterns for factory use.

The Hohmann and Maurer Manufacturing Company among their exhibits include improved gas leakage indicators, dial pressure gauges, and air-meters for gas-works. This firm's gas-works specialities have been described from time to time in the "Journal."

Interest for Lighting Engineers.

Lighting receives a small amount of exposition—in fact, there is no special general display of lighting. The James Keith and Blackman Company, Limited, are to the fore in a fine central position; the United Kingdom Lighting Trust, Limited, are also represented, as are the Ramie Company, Limited, and the De Laitte Gas-Machine Syndicate, Limited.

Dealing first with the lighting exhibits of the James Keith and Blackman Company (which exhibits only form part of the large display the firm make), they all, of course, exemplify the application of the high-pressure gas system to illumination other than domestic. Here the compressor (a No. 3, capable of compressing 500 cubic feet per hour) used for raising the pressure of the gas for the supply of the burners and lamps on view—ranging from a small factory light up to a large and handsome type of the so-called arc lamp—is operated by electricity. (Other examples of compressors, both smaller and larger, are also on view.) This operating of the compressor by electricity affords an opportunity for correcting a common erroneous notion that the firm's plant can only be worked by means of water power. As a matter of fact, any available power can be employed; it is all a matter of convenience. And in the case of the Keith light a very moderate pressure suffices—anything between 8 and 12 inches. With the moderate additional pressure, their special burners combine to realize the excellent results that have obtained for the system so much patronage. In arranging the stand, the fact that most of the visitors will be engineers interested in the lighting of workshops has been kept in view; and, indeed, the engineering industry offers considerable scope for the lighting engineer. It is not too much to say that every conceivable form of fitting requisite for factories, workshops, and ordinary shops, railway stations, and so forth, giving lights of different intensities according to the purpose, is shown. The ascribed illuminating powers of the lamps supplied by the firm are not fictitious; they are the actual guaranteed powers of the different lamps exhibited. With certain of the lamps, an illuminating power of 35 candles per cubic foot is obtained; and with many up to 40-candle power. In two of the newest forms of the large lamps—Nos. 10 and 40—the visitor is shown how they can be regulated, even while in use, from the outside; and how with the same lamps

the globe can be slid down on the frame for cleaning purposes, and then slid up again—being held in position by a catch at the bottom part of the lamp. The arrangement is simplicity itself, and should be valuable in keeping lamps in perfect order, and up to the very highest point of efficiency. For industrial lighting, the firm are now going in largely for the inverted burner; and the definite pressure at which the gas is supplied ensures constancy of light. This is important with the inverted burner. This extension of the high-pressure system to the inverted burner has enabled the firm to compete with the electric light with even greater effect than before. They also point out the advantage of having gas at high pressure in industrial establishments, not only for lighting, but for many industrial uses—such as for soldering irons, laundry irons, and in printing for the linotype pots. With the one compressor, several operations can be furnished with high-pressure gas; whereas formerly there had to be an individual machine for each class of work. The electric ignition arrangement of the firm has, we learn, become very popular; and its efficiency is demonstrated at the stand. Another exhibit must not be overlooked. That is a gas-engine anti-fluctuator, which ensures correct registration of meter, and supplies the gas to the engine at a constant pressure, so enabling the highest efficiency to be obtained from the engine. Reports that the firm have received, assert the uniformity of working and reduction of bills, through the regulation afforded. The cost of the apparatus, according to size, varies from (say) £7 up to possibly £100. But the small-sized example shown will give all the information desired.

The United Kingdom Lighting Trust, Limited, are displaying the Kitson high-power system of oil-gas incandescent lighting; but the greatest interest for gas engineers will be found in the demonstration of the "U K" air-compressing system for incandescent gas lighting, which was the subject of a descriptive article last week (p. 691). The Company are also showing the "Black Diamond" mantle, which is a moderate-priced production, made specially strong, for ordinary or high-pressure gas lighting.

The Ramie Company, Limited, of Bredbury, near Stockport, have entered with a demonstration of the Zeimar incandescent gas-mantle, and a display of the various raw materials used in the manufacture of the mantles from the nettle grass throughout the range of chemicals and rare earths. Burners and fittings for various purposes are also shown.

Gas-Engines.

In the gas-engine section, the application of suction gas plant is the feature that will most attract engineers, though information as to use with town's gas is freely given.

At the stand of Messrs. Crossley Bros., will first be noticed one of their "UE" type high-speed electric lighting gas-engines, combined with a dynamo for lighting the stand with arc and incandescent electric lamps. This engine has been fitted with electric ignition, and is capable of developing 39 effective horse power as a maximum with suction gas at a speed of 220 revolutions per minute, and 49 effective horse power as a maximum with town's gas. On an adjacent stand is seen one of the "U" type gas-engines for driving machinery in the exhibition. This engine is fitted with electric ignition, and is capable of developing 42 effective horse power as a maximum with ordinary town's gas, and 32 effective horse power as a maximum with suction gas, at a speed of 180 revolutions per minute. Both these engines are worked from one of the firm's No. 5 suction gas plants, capable of supplying engines up to 90 brake horse power. Anthracite coal is used with this plant.

The National Gas-Engine Company, Limited, have on view three engines, all worked by suction gas plant. The display is of interest, as the engines and plant are similar to those entered and ran at the trials recently held by the Royal Agricultural Society at Derby, and for which the Company were awarded the first prize and gold medal. Additional point is given to this by the protest against the trials that has been made by an unnamed firm in the "Engineering Supplement" of "The Times."

Kynoch, Limited, have on view a 19·5 brake horse power gas-engine, coupled direct to a 14 kilowatt dynamo. The engine is supplied with gas from one of the firm's suction gas plants; the cost being stated at less than 1½d. per hour at full load.

Messrs. T. H. & J. Daniels, Limited, also show two engines that have been converted for working on suction gas; and they are driven by one of the firm's suction gas plants of 25 brake horse power.

It will be seen from this general glance round the exhibition that it is not barren of interest even for the gas engineer; and many, we have no doubt, will find their way to Olympia during the next four weeks.

"ELECTRICAL REVIEW" MAKES A DISCOVERY.

The "Electrical Review" has made discovery of a mistake in the table which accompanied the paper read by Mr. A. Pollitt, before the British Association of Textile Managers on the subject of the "Lighting of Mills and Workshops," and extracts from which were published in the "Journal" for Aug. 28. No complaint can be made of our contemporary for setting right what, by calculation, is found to be a mistake. But when our contemporary sits in judgment—forgetful that it is human to err, and that it cannot claim for itself impeccability—it delivers itself (without allowing that an accident may have occurred) with a vehemence that would do credit to a socialistic demagogue. The error occurred through a wrong set of figures being placed under the heading "Cost per Thousand-Candle Power per Hour." The "Review" has calculated the figures from the data given in the preceding columns; and the corrected result is as follows:—

	Cost per 1000 Candle Power per Hour.
Ordinary flat-flame burner	10·95d.
Incandescent mantle	2·85
Welsbach self-intensifying lamp	2·53
Compressed gas	2·409
Electric incandescent	7·92
Electric arc	2·722

The paper was sent to us in printed form; and as life is too short for the staff of a journal to analyze and test every statement and figure (for which every author who identifies himself by name with a production is responsible), the figures were published as received. But how the wrong ones came to be inserted under the heading in question is quite satisfactorily explained by Mr. Pollitt. It arose entirely through the piecing together of various columns from the separate original tables, in order to economize space in the textile journal in which the paper was originally printed. An inquiry of Mr. Pollitt brought from him a reply which will, we hope, assuage the perturbation of our contemporary over this simple blunder. The letter reads:

I find that the exceeding wrath of your contemporary is, in one respect, justified; and unfortunately I have to confess to a umble of figures in the column to which attention is called. This has been brought about by my having, when lecturing, used separate sheets, with a more extended table for gas and electricity respectively. In the preparation for printing, in order to economize space, the tables were joined, with some columns struck out altogether; and, in the case of gas, the figures for "Cost per 20-Candle Power Burner" have been placed under "Cost per 1000-Candle Power per Hour." While this is very much to be regretted, the previous column (total cost per hour) is the one to which most importance is attached; and in this, as in the figures given for capital expenditure, upkeep, &c., I do not fear any criticism as to their accuracy. They are the results of installations *actually at work*, where careful records have been kept, and where the makers have in each case known that this was to be done for reference. In any discrepancy between different works with the same installation, I have taken the average.

I have had charge for many years of a large electric light installation, was for a long time a strong advocate of incandescent electric light in cotton-mills, and have put in plants of different capacities up to 20,000-candle power. But I was not such a blind advocate of electricity as not to notice what progress was being made in other directions, with the result that, where efficiency and economy are desired, I am compelled to recommend gas in one or other of its methods of application; and in no case have I had any dissatisfaction with the introduction of compressed gas.

The "Electrical Review" charges me with an excessive capital expenditure for an installation of a 20,000-candle power plant for incandescent electric lighting, without going in detail into the alternate figures given, by which my estimate is reduced by nearly one-half. I may say that even to-day if the critic will undertake contract work on this basis, he will be inundated with orders. My figures are the successful tender for a plant of exactly this size for a typical Lancashire cotton factory, where the competition—between nine competitive firms—was very keen. This is, I think, a sufficient answer, without troubling about the glaring omissions in his estimate of £1300. It is ridiculous to talk of a complete installation at an average of £1 per 16-candle power lamp.

I admit that the few hours' lighting compared with the total number worked tells heavily against electric lighting on account of its excessive capital expenditure; but my average of 450 hours' lighting per annum is above, and not below, the mark. Many mills do not light more than 320 hours; but in towns it may be said to be not exceeding 420 hours.

With Mr. Pollitt, we regret the error. His letter is a complete reply to the fearfully and wonderfully composed inquiry of our contemporary, which was intended to fall heavily: "Is it a piece of gross carelessness, wilful perversion, awful incompetence, or what?" How terrible! and yet no one feels any the worse. Mr. Pollitt is a man of practical experience in the matter of lighting mills and factories, and a man with an open mind. He is perfectly capable of taking care of himself.

Eastern Counties Gas Managers' Association.—The following programme has been arranged for the visit of the Eastern Counties Gas Managers' Association to Tottenham, which will take place on Wednesday, the 26th inst. The members will meet at the entrance to the Tottenham Gas-Works at 10 a.m., and will inspect the works. They will then proceed to the High Road offices and stove shops. After looking over these, there will be a drive to the Forest Hotel, Chingford, for lunch, which will be kindly provided by the Chairman and Directors of the Tottenham and Edmonton Gaslight Company. The business meeting will take place in an adjoining room, after lunch. Mr. E. J. Brockway, of Cleethorpes, will be inducted as President, and will deliver his address; but no papers will be read. After the meeting, the drive will be resumed to the Gothic Works of Messrs. Thomas Glover and Co., Limited, which will be inspected, and also the Gas-Meter Testing-Station adjoining. Tea will be provided by Messrs. Glover and Co. There will be no dinner in the evening.

PROPOSED GAS EXHIBITION AT MANCHESTER.

THE following letter—under date of the 11th inst.—has been received from Mr. H. Kendrick, of Stretford, the Hon. Secretary of the Manchester District Institution of Gas Engineers: "I am requested by my Committee to ask you to be good enough to print the enclosed communication in your next issue. We have had some correspondence with Mr. Cotton; and he seems to think we are proposing our Exhibition in Manchester in 1907 in opposition to theirs."

The Committee of the Manchester District Institution of Gas Engineers have made arrangements with Mr. Cawood, the Manager of St. James' Hall, Manchester, to hold an "Exhibition of Gas Appliances (Industrial and Domestic) and Gas Lighting," about October, 1907. The exhibition will probably be open for sixteen days.

The scope of the intended exhibition will be better understood if reference is made to the report on the Earl's Court (1904) Gas Exhibition, issued by the Advisory Committee; the following selection covering the classes into which it is proposed to group the exhibits:—

Division I.	1. Outdoor lighting.
	3. Interior lighting.
Division II.	1. Cooking.
	2. Heating.
	3. Ventilating.
Division III.	Motive power.
Division IV.	Industrial uses of gas.
Division VI.	Coke burning stoves, &c.
	Tar products, dyes, &c.

In place of Division VII., it is intended to set apart a considerable space for exhibiting models of gas plant and machinery—the Committee finding an attendant capable of explaining the working of the models.

It is intended to enlarge the scope of Division IV., by introducing machinery and processes using gas, and various apparatus enabling incandescent gaslights to be used more economically in textile and other factories.

All applications and charges for space and services will be submitted to an Advisory Committee of local gas engineers before being finally accepted. The lighting and ventilating of the building will be sublet to competent firms, under the advice of the Advisory Committee.

The Committee desire to make this exhibition an object-lesson to the public, to gas-fitters, plumbers, manufacturers, architects, and all those interested in smoke prevention. In the solution of the last-named problem, the manifold uses of gas in the domestic arrangements has already gone a good way; and the latest appliances to this end will be shown. In general, it is intended to show the service that gas can render to the manufacturer, the professional man, the merchant, the shopkeeper, and the private resident, whether in cottage or hall. Cookery lectures and demonstrations, and lectures on the uses of gas in various trades will be arranged, and if possible, scientific and popular lectures.

As there has not been any really representative Gas Exhibition in the Manchester district before, and having regard to the great developments which have taken place in connection with the industry of late years, it is hoped that there will be shown a great number of important manufacturing appliances, machines, and processes using gas for various industrial purposes.

How important an area this proposed Exhibition is intended to serve will be recognized from the fact that, within a radius of twenty-five miles from the centre of Manchester, there is a larger population than in any similar area in the world.

It will be seen from the foregoing that the Manchester Committee have no intention of running this Exhibition in opposition to the one in Dublin, as the latter will be closed by the time the former is opened.

It will be well to call to the minds of your readers the inception of the proposal. At the November, 1904, meeting of the Manchester District Institution, it was suggested by Mr. W. Whatmough, of Heywood (see "GAS JOURNAL," Vol. LXXXVIII., p. 696; "Gas World," Vol. XXXIX., p. 1038), that the lighting and heating sections of the Earl's Court Exhibition should be transferred to Manchester at the close of the Earl's Court Exhibition. This proposal was discussed at the informal meeting of the Manchester Institution held in the Lecture Hall at Earl's Court on Dec. 9, 1904, when it was decided that this proposal was impracticable, but the meeting instructed the Honorary Secretary to circularize the exhibitors, and the members of the Manchester Institution, to ascertain their views as to the holding of an exhibition in Manchester in the autumn of 1905 (see "GAS JOURNAL," Vol. LXXXVIII., p. 830; "Gas World," Vol. XXXIX., p. 1137). The result of the inquiries was unfavourable to an exhibition in 1905, but favourable to one being held in Manchester at a later date. This was reported to the Manchester Institution in February, 1905 (see "GAS JOURNAL," Vol. LXXXIX., p. 570; "Gas World," Vol. XLII., p. 367). After being discussed at each meeting during the year, the question was again raised in the annual report, February, 1906 (see "GAS JOURNAL," Vol. XCIII., p. 493; "Gas World," Vol. XLIV., p. 405), immediately after which a special Exhibition Sub-Committee was appointed. This Sub-Committee has had a number of meetings, and has made such satisfactory arrangements with Mr. Cawood, of the St. James' Hall, Manchester, that, while the Institution is entirely free from any financial responsibility, the Advisory Committee will practically control the arrangement of the Exhibition.

The great Corporations of Manchester, Salford, Stockport, Bolton, Oldham, &c., have been approached for their support in the venture; and Mr. Alderman Gibson has promised (subject to confirmation) the whole-hearted approval and support of the Manchester Gas Committee.

LOCAL GOVERNMENT BY PARTY.

IN our view it is somewhat a matter for regret that there should seemingly be a preference for municipal elections and business to be carried out on Political Party lines. The analogy between parliamentary affairs and purely local questions is not very easy to see; and while it would perhaps be generally impossible to deal with complex national problems on other than broad Party lines, there does not appear to be any real reason why local matters should be treated in a similar manner. In the last few issues of the "Accountant" there has been a series of articles dealing with municipal accountancy and the financial control exercised, or to be exercised, by local authorities over the affairs with which they are entrusted; and in the final one the matter alluded to in the opening sentence here is dealt with. Our contemporary urges that the pressing need of the moment is "not so much a really good and reliable system of accounts (though, of course, that is an absolute necessity before any class of business can be conducted upon satisfactory lines), but rather a reorganization which will go more to the root of the whole matter, and secure both a more effective and a more direct system of control by those who from time to time represent the majority of the ratepayers—and *per contra* a more definite responsibility for their acts and omissions." This eminently desirable consummation it is proposed to attain by increasing the Party character of municipal bodies; and the suggestions put forward to this end may be briefly outlined.

In the first place, it is frankly acknowledged that the existing plan of fighting local elections on Party lines is illogical, and that it would doubtless bother anyone to say why persons should be selected for the control of local affairs solely by reason of their opinions in connection with other and entirely irrelevant matters. It is, however, argued that as in the nature of things the majority of candidates are personally unknown to the majority of voters, it is natural that some sort of process of labelling should be resorted to; and that therefore the plan has conveniences which are not likely to be readily abandoned merely because they are illogical. Assuming then that the present system must be regarded as a fixture, the writer—in his desire to introduce into local elections a little more of the life and enthusiasm which influences general elections, and which, "by keeping the pendulum more or less constantly in motion, secures the maximum amount of efficiency from both Parties by the simplest possible procedure of making them assured that it is only by continued efficiency that they can continue to hold office"—advocates its extension. The suggestion he makes is that in all forms of local government the Party representing the majority in power should have the sole nomination on all committees (instead of, as at present, choosing the members from the whole of the council), and that upon it should devolve the entire responsibility of carrying on the business of the authority, and especially of the trading departments, leaving the minority for the time being free to criticize and advise. The advantages claimed for the proposal are certainly alluring—more information than at present would be accorded, in such a form as to reach the electors through the Press; debates, instead of being hopelessly dull, would become animated and instructive in the extreme; successive parties would vie with each other to produce more satisfactory results during their respective terms of office; and their policy would be more closely and intelligently followed by the electorate, and all persons concerned (from the highest to the lowest) would take a greater interest in what was going on. Such a scheme our contemporary regards as practically the only way of bringing the requisite amount of public attention to bear upon local affairs; and various subsequent elaborations are outlined. For instance, it is suggested that the Local Government Board might have power to dissolve the Council and call a general election at any time; or it might be required that such an election should be held whenever a loan applied for by the local authority had been refused, or whenever a prescribed minority of voters petitioned the Local Government Board.

Of course, this is merely an indication of the line adopted by the writer of the article in question—which is to be found in the issue of the "Accountant" for the 8th inst. The arguments are at any rate worthy of consideration by those interested in the subject; and the scheme is, as will be seen, on somewhat novel lines. For our own part, we would much rather, if possible, see councillors and committeemen elected from a personal than from a party standpoint. At the same time, there is urgent need to get the electors to take a more active interest in local government affairs; and if the present and prospective burden of the rates is not sufficient to accomplish this, some other means should be tried.

AN "ELECTRICAL BULLETIN" FOR LONDON.

For the preservation of their business, the Electricity Supply Companies of London have found it necessary to commence to issue quarterly an "Electrical Bulletin," very much of the character of the West Ham one which we reviewed last May. That the object is preservation, is seen from the fact that on the front of the wrapper, on its second page, and in the heading on the first page of matter appear the words "A Quarterly Budget of Information for Electricity Users." There is therefore no mistake about the purpose of the new periodical; it is only intended for those who are already users of electricity. Development of business is not in view, or the "Bulletin" would have been addressed to the users of gas in London. The Editor also states that it will "demonstrate, in a practical and popular manner, the adaptability of electricity to lighting, power, and heating purposes." But it does not state that it is also intended—as the first number adequately discloses—to revile gas to the uttermost, leaving out of consideration its merits, and likewise ignoring the weaknesses of electricity as an agent for lighting, heating, and power. The Editor is Mr. Spencer Hawes—a gentleman who fell foul of certain Borough Councils when the Administrative County of London Electric Power Company's Bill was before Parliament in the session of 1905. In his temperament, a Sherlock Holmes would say from the plain evidence presented in the first editorial notes in the "Bulletin," egotism is not a negligible quantity. Perhaps, however, it is helpful, when one has a difficult task to perform, to believe thoroughly in one's self. "The 'Electrical Bulletin,'" it is written but few will believe, "marks another stage in the progress of electric supply." If the "Bulletin" is representative of the stages that mark the progress of electric supply, the electricity industry will not be proud of having the illustration published among 60,000 electricity users in London—that is said to be the number of the first edition subscribed for by the Electricity Supply Companies.

For the most part, the contents are a *réchauffé* of things that have been said over and over again; and that they have still to be served up indicates that their previous saying has not been so effective as the suppliers of electricity could have wished. There are a couple of columns devoted to "Destructive Gas," consisting of five incidents culled from no less an immaculate authority than the "Star" and one from the "Globe." But there is not a similar miscellany under the heading of "Destructive Electricity," giving an account of fires and fatal and other accidents caused by electricity; nor is anything said of the vagaries of electricity, of its failures at most inopportune times, and of the inconveniences to which electricity consumers are often subjected. Then half a column is devoted to "Gas Degeneracy," the subject being the removal of the statutory restrictions as to sulphur compounds. The Editor is so wrapped up with preaching the gospel of electricity that he misses the higher gospel which teaches that "honesty is the best policy." Honesty is not within him sufficiently to move him to tell his readers that those restrictions applied to less than fifty gas undertakings in the United Kingdom, and in no other part of the world were they inflicted, and that all the others have from their very commencement been exempt from them. Nor does he point out what the abrogation of the restrictions really means. Perhaps he does not know. Information can be gained from an editorial in our issue for Aug. 21. Therein the Editor will find that a ton of coal contains about 35 lbs. of sulphur. Consumed in the domestic fire place—or, shall we say? at the electricity generating-station—the greater part of the 35 lbs. of sulphur is sent into the atmosphere as sulphuric acid. Crude coal gas contains about 800 grains of sulphur per 100 cubic feet, of which 20 grains have always been allowed to remain in the gas distributed to consumers in London. The removal of the sulphur restrictions—purification of gas by oxide of iron and by scrubbing and washing still continue—extends the limit to, at the most, an average of 50 grains. Thus formerly 780 grains of sulphur were removed; but now about 750 grains are eliminated. Is it too much to hope that Mr. Spencer Hawes will give the readers of the "Bulletin" these facts when his next number is issued?

The information (which has gone the round of the "Electrical Bulletins") again crops up that the "Harrow Observer" some time ago had a 4-horse power gas-engine for sale, owing to the fact that—apparently the owner of the paper had not a stand-by—it broke down, and an electricity motor was quickly installed by the Engineer of the local Electricity Company, who was doubtless very thankful to have the opportunity. Of course, gas-engines like other machinery, and even men, cannot go on for ever. Surely this poor little 4-horse power gas-engine has now done sufficient duty for the electricians. Another illustration refers to the breakdown of a gas-engine driving the plant at a cold storage establishment in North London. There was £3000 worth of perishable stock in the place; and prudence, it may be supposed, had not suggested that a duplicate engine would be an insurance against an accident of the kind, and against any sacrifice of a valuable stock. The owner has had electric motors installed. We should advise him to see whether it is possible to get connected up to two electrical systems, for it may be his electricity supply that will be cut off next time he experiences an accident. If the Editor of the "Bulletin" requires for publication a few examples of electrical motors having been evicted by gas-engines, application should be made to the Gaslight and Coke and other Gas Companies. The same old things are said concerning the lighting of the new Victoria Station by high-pressure incandescent gas-lamps. Of course, the Editor thinks it could be done much better by the flickering, dazzling, and concentrated light of flame arcs; and he points with exultation to the choice of flame arcs for Charing Cross Station. Naturally, the writer of a special article extolling the virtues of "Electric Light" would not be doing his duty, if he did not take a most optimistic view of this system of illumination, and cast all the opprobrium possible on gas lighting. Readers of an article under such a heading will naturally expect what they receive in it. We should, however, like chapter and verse for the words italicized in the following sentences: "At a recent meeting of gas shareholders, Mr. Corbet [one "t" please, Mr. Editor, not two] Woodall, the Chairman of the Company, remarked that competition had never been so severe. *So little did he think there was to choose, on the score of cost between the two competitors*, that he suggested a revival of meter-rents in order to allow the Gas Company to reduce its present rate of 2s. 11d. by one penny." If recollection serves correctly, Mr. Spencer Hawes is responsible for the analyses of electricity accounts that appear in the "Electrical Times;" and therefore it may be expected that he is a diligent student of the matter appearing in the columns of our contemporary. In the issue of that paper for Feb. 8 last, "Meteor" made this remark: Mr. Corbet Woodall's "admission that it is essential to keep the price of gas low, is an admission that there is little to choose between the various competitors on the matter of cost." This is a different matter to definitely attributing to Mr. Woodall the statement as printed in the "Electrical Bulletin." Unless he can confirm that statement (and we do not think that he can), the Editor, if he desires to be honest-spoken, ought to correct it in the next issue.

Later on, we find the "Bulletin" quoting the "Journal" reference to the use of electric motors for driving the coal-handling plant at the Wavertree Works of the Liverpool Gas Company. Circumstances alter cases. It is not explained in the "Bulletin" that electricity generating plant was installed as the most convenient method of driving a new travelling retort-charging machine; and that therefore it was economical to give the electricity generating plant as much work to do as possible, and the character of the work to be performed is particularly suited to electricity motors. We are not quite so unreasonable as to suggest that for all power purposes gas is the best; but it is for a respectable majority. We take it that the Editor of the new periodical has no objection to electricity being employed in the humble but useful task of lifting and carrying coal, and charging it into retorts for the production of the gas that is its own strongest competitor. There are cases of gas-engines reciprocating [only one meaning intended, Mr. Editor] by being coupled up to dynamos.

Without dipping farther into the "Bulletin," enough has been said to show that it has been prepared especially to decry gas in all directions without those responsible for its production being over-scrupulous on the point of fairness. The London Gas Companies might do worse than respond with "A Review of the Electrical Bulletin." Perhaps, however, they will consider that, if the first number is a fair sample of what is to follow, it will defeat its own object among intelligent men.

San Francisco and its Gas and Electric Supply.

Writing to "Progressive Age," the Secretary of the Pacific Coast Gas Association (Mr. John A. Britton, of San Francisco) says that the city is now in a more prosperous condition than it was prior to the fire. Men and material only are scarce on the coast. The centre of distribution of both gas and electricity has been completely changed without any noticeable effect. There were cleaned up and connected over 45,000 gas services and over 10,000 electric services within sixty days after the fire; and to-day, so far as gas and electric service is concerned, normal conditions have been restored. The gas output approaches to within 10 per cent. of the output for the same period last year, and the electric service to within 30 per cent.; and at the pace that orders are coming in for the two services, in both the burned and unburned districts, within 90 days, Mr. Britton estimates that they will be selling as much gas and electricity as in 1905. The Pacific Coast Gas Association are holding their fourteenth annual meeting this week in San Francisco, when there is a long list of papers to be read and discussed—among them one by Mr. E. C. Jones, on "How the San Francisco Gas and Electric Company Supplied 40,000 Consumers after the Fire;" and another by Mr. E. L. Reynolds, on "How Electricity was Served to Consumers and Street-Car Lines after the Fire."

Society of British Gas Industries.—Arrangements are being made for the holding in November of a general meeting of the members, with a dinner in the evening of the same day.

Manchester District Institution of Gas Engineers.—The Hon. Secretary (Mr. H. Kendrick, of Stretford) desires to remind the members that nominations for the Committee, officers, or new members must be in his hands by the 30th inst., if they are to be included in the next balloting list.

MEETINGS OF THE ITALIAN AND SWISS GAS ASSOCIATIONS.

An International Gathering of Gas Engineers.

As already announced in the "JOURNAL," the proximity of the dates and places of the annual meetings of the Italian and Swiss Associations of Gas Managers this year was considered favourable for the holding of an international gas congress; and the idea was successfully carried out last week.

SWISS SOCIETY'S MEETING.

The meeting of the Swiss Society was held at Lugano on the 9th inst., under the presidency of Herr Paul Miescher, of Bâle. The preliminary business having been disposed of, the President delivered an address; and papers on the following subjects were presented: "The Gas and Water Supply of Lugano," by Herr Guidi, of Lugano; "On Gas Coals," by Herr Weiss, of Zurich; "The Thermal Springs of Baden and their Utilization," by Herr Peter, of Zurich; "The Extension of the Berne Gas-Works," by Herr Roth, of Berne; "The Extension of the Water Supply of St. Gall, by Herr Kilchuren, of St. Gall. The reading and discussion of these papers was followed by a talk on the Milan Exhibition; and the remaining business was of the usual character. These matters occupied the morning. Early in the afternoon the members dined together in the Hôtel Métropole; and later on they inspected the gas-works. The next day, those who purposed joining their Italian colleagues made their way south to Milan.

ITALIAN SOCIETY'S MEETING.

This meeting was held on Monday afternoon last week in one of the halls of the exhibition grounds, under the presidency of M. Lacombe, who has lately been appointed Manager of the Milan station of the Cie. L'Union des Gaz, and who has also charge of the Genoa Gas-Works. Upon the platform was the Perpetual President—the *doyen* of the Society (Signor Giovanni Bonn, of Verona); and in attendance was the genial Secretary (Signor Federico Laeng, the Manager of the gas-works at Brescia). The first business was the approval of the minutes of the 34th annual meeting, held at Genoa in June last year, and the passing of the accounts. The admission of new members, the announcement of the resignations of others, and the recognition of the work of those who had died during the year, next occupied the meeting. A Committee having been appointed to award the premiums to meritorious workmen, the attention of the members was at once directed to the three important matters affecting gas undertakings in Italy to which reference has already been made in the "JOURNAL"—viz., the Bills relating to work on holidays, labour contracts, and the periodical verification of meters. In regard to the last-named matter, it was mentioned in an article which appeared in our columns on the 14th of March that the Italian Parliament propose to modify and extend the existing taxation on meters by imposing a fee for the first verification, with an additional fee whenever the meter may be moved or refixed. Moreover, all gas and water meters are to be subjected to compulsory verification every five years. In noticing these proposals in the article referred to, it was said that they called for the strongest protest and condemnation. The Italian Gas Society are quite alive to the necessity for some action being taken; and a strongly supported petition on the subject has been presented to the President of the Chamber of Deputies. A petition has also been presented by representatives of the gas industry to his Excellency the Minister of Agriculture, Industry, and Commerce on the rest-day question, as well as one to the proper authority on the other subject affecting workmen.

The remaining matters of a general character, including the appointment of a Committee in connection with next year's competition, were then disposed of, and the meeting proceeded to turn their attention to technical matters. A subject of considerable importance was introduced by Signor G. Beria, the Manager of the Turin Gas-Works—viz., the proposed imposition of a municipal tax on gas. This matter has also been recently referred to in our columns. Signor Beria pointed out that gas is already too heavily taxed by some of the Italian municipalities; and the levy of 3c. per cubic metre at Turin is resented by the Consumers' Gas Company, which is a sort of co-operative concern, as being in excess of the legal limits. The matter, as may be remembered, has been the subject of legal proceedings, with the view of obtaining a reduction of the tax, but unfortunately without success—the Court of First Instance having confirmed the action of the Municipal Authority. Seeing that, in addition to the municipal tax, the Government impose one of 2c. per cubic metre—making together 5c., or equal to 1s. 1½d. per 1000 cubic feet—the Company appear to be fully justified in regarding the imposition as an enormity. At all events they are going to take the matter further, as they regard the present condition of things as being most detrimental to the gas industry; and they entertain the confident hope that they will eventually be successful. The President thanked Signor Beria for his valuable paper, which he thought was of general interest. It may be said to have been the chief technical topic of the day; and with this reference to it, we may close our notice of the preliminary meeting.

THE INTERNATIONAL GATHERING.

The meeting of the members of the two Societies was held the next morning in the Salone della Previdenza at the Exhibition. It was expected that the Pro-Syndic of Milan (Signor L'On Avv. Della Porta) would preside over this gathering; but unfortunately he was unwell, and therefore unable to attend. The meeting was called for nine o'clock; but it was close upon ten when the President took his seat. He had upon his left hand M. Coze, the President of the Société Technique du Gaz en France; Herr Weiss, representing the Swiss Society; and Signor Bonn again occupied a seat upon the platform. They had before them a gathering of about 160 representatives of the gas industry; the Swiss and Italian numbering 60 and 70 respectively, the French 30, and there were two from Holland. England and Germany were not represented. M. Payet, the Secretary of the Société Technique, Heer Bolsius, the Editor of "Het Gas," Cap. Vittoria Calzavara, the Editor of "Il Gaz," M. Chamon, M. Derval, and others whose faces are familiar to those who attend meetings of the foreign societies, were among the company at the meeting or at the social functions.

The President having formally opened the proceedings, M. Coze and Herr Weiss in a few appropriate remarks expressed their thanks for the invitaton offered to them to attend the congress. The business of the meeting commenced with the reading by the Secretary of the report on the subject of the papers submitted in competition for the Society's prizes of £20, £30, and £40 offered last year. As mentioned in the preliminary notice of the meeting which recently appeared in the "JOURNAL," there were only three—the first on the subject of the relative merits of horizontal, inclined, and vertical retorts; the second, on the extraction of tar and the condensation of gas; the third, on the effect of electrolysis on gas-mains. They came from Holland, England, and France; there being no paper from Italy. The President explained the scope of the papers, prints of which were distributed, and invited discussion upon them. The first speaker was Signor Böhm, the Manager of the San Celso works in Milan of the Cie. L'Union des Gaz, who said he considered the first essay the best, as being most adapted to modern conditions. As to the second paper, he doubted whether the suggestion of the author, if put into practice, would be successful. With regard to the third, he thought that there was really nothing in it. Signor Böhm was followed by Signor Boella, of Turin, who considered the first paper of no interest to the managers of the smaller gas-works in Italy; the figures given in regard to maintenance being inapplicable to such works. As to the second paper, he looked favourably upon it. He thought the subject dealt with had been well chosen, as it was one of general interest; but the practical solution of the problem was somewhat difficult. He shared M. Böhm's opinion as to the third paper. M. Lacaze referred to the work of M. De Brouwer in devising machinery for charging and discharging retorts, and compared the various points of inclined and vertical retorts. He recalled the fact that one of the latter was invented about twenty years ago by a Lyons gas manager, but that he found some difficulty in making it work. M. Coze offered a few remarks on the first paper. In his opinion, the solution of the problem as to which system to adopt depended upon conditions of space. A discussion then took place on the question of awarding the prizes, and in the result it was decided to give a bronze medal and 500 lire for the first paper, bearing the motto "Nella Speranza di Riuscita." On opening the sealed envelope accompanying it, it was found that the authors were Heeren W. Cool and P. H. Hendricks, of Rotterdam. No other awards were made.

M. Coze offered a few remarks on the Act as to the compulsory rest-day for workmen which came into operation on the 1st of the present month, and its effect on the gas industry, and said the Government had refused to modify the law, but a meeting was to be held in Paris shortly to consider the question. The Secretary followed by reading a report prepared by the President on the gas exhibits at the Exhibition. It was then decided to hold the next meeting at Bologna; and this brought the business to a close.

A GLANCE AT THE EXHIBITION.

The interval for luncheon was utilized for a glance at the Exhibition; but, though of much general interest, it was not of striking importance to gas engineers. The well-known French houses of Vanderpol, Maldant, et Dupoy, Brunt, Siry, Chamon, et Cie. show gas-meters, pressure-registers, &c. — the Siry "Duplex" meter being on view in sizes from 3 to 150 lights. The firm of Julius Pintsch, of Berlin, have a good display of gas-meters, lamps with automatic lighters, railway and street lamps; and on a second stand some baths and bath-heaters. The house of Fried. Siemens, of Vienna, show a gas kitchen-range, two geysers, and six hygienic gas-heaters—a speciality of the firm—by which the cold air is drawn in and the hot air expelled. The Società Anonima Italiana "Vulcano" (formerly Ingg. Moreno Dautony) show seven samples of the thermo-radiator for which the Société Technique awarded a bronze medal at the last congress. Only one English gas-stove firm was enterprising enough to make a

show at the Exhibition, and that was the Richmond Gas Stove and Meter Company, Limited, who have brought together a representative collection of gas appliances, consisting of their "Model" sizes of cookers, the "Crusader" stoves (both kinds being of special Continental patterns), bath heaters suitable for the Italian trade, gas-fires, wet and dry gas-meters, &c. A conspicuous feature is a large carving table in white enamelled iron for three joints. While referring to this firm, it may be mentioned that they show a photograph of an installation of gas apparatus capable of cooking for 150 persons which they have put up at the Vatican; and others of installations supplied for preparing the mid-day meals for about 700 children at the Giulio Romano elementary schools. As being connected with gas-works, it may be mentioned that the Glenboig Union Fire-Clay Company, Limited, have a stand on which is a representative collection of their goods; and the Vale of Neath Dinas Fire-Brick and Cement Company, Limited, also show similar goods.

Visit to the San Celso Gas-Works.

The Cie. L'Union des Gaz have several stations in Milan; one near the Central Station, capable of producing 40,000 cubic metres, or about 1½ million cubic feet of gas, per day, and another at the Porta Venezia, of about one-fourth the capacity. The principal station is at San Celso. It consists of the old works, equal to the production of 120,000 cubic metres of gas per day, and those put up during the past few years; and it was the latter which the visitors were invited to inspect. Notwithstanding the attractions of the Exhibition they assembled in good numbers at the works at four o'clock, and were received by the President, who, accompanied by Signor Böhm, the Manager of the station, conducted the party through the establishment, which is capable of producing about 160,000 cubic metres of gas per day. The first place inspected was the retort-house, great interest in which was displayed. It contains six benches of inclined retorts, each having eight beds of nine retorts. In four benches the retorts are 20 feet long, and in the other two 16 feet. This is the house about which readers of the "Journal" learnt a great deal not long ago, under circumstances to which it is unnecessary to refer now. Four of the beds are on the Stettiner system; and some of them were at work. The day was delightful outside; and therefore the operations of charging and drawing retorts, with the attendant clouds of thick, black smoke, were not witnessed without some slight discomfort. Yet they were keenly watched, and the open retorts were gazed into without flinching. Coming again into the purer air, the visitors passed into the large building containing the condensing and exhausting plant. There are 15 air condensers 7·5 metres (about 25 feet) high and 1 metre (about 3 ft. 3 in.) internal diameter. The exhausters, of Donkin's make, are four in number—two large ones, each of 90,000 cubic metres per day, and two small ones, each of 50,000 cubic metres daily capacity—say, 3·18 million cubic feet each for the former, and 1¾ millions for the latter. There are three Pelouze and Audouin tar-extractors, and a like number of Morris and Cutler's water condensers and Kirkham, Hulett, and Chandler's "Standard" washers, each of 60,000 cubic metres capacity per day. There are five boilers by Babcock and Wilcox—two pairs and one single; and a water softener is provided for use with them. The sulphate plant consists of four sets of the Simon-Carrès pattern, made by MM. Siry, Chamon, et Cie. Passing into the spacious purifier-house, the visitors saw a range of eight purifiers, each having an area of 125 square metres, or about 1344 square feet, and being capable of dealing with 170,000 cubic metres, or about 6 million cubic feet per day. They are provided with overhead elevating and automatic discharging machinery. The governors (three in number) are in the old works, which are divided from the new ones by a road. One has 3 ft. 3 in. and the other two 2 feet inlet and outlet pipes. There are three station meters—two by Brunt—each of 55,000 cubic metres, or close on 2 million cubic feet, daily capacity, and the other a "Duplex" by MM. Siry, Chamon, et Cie. There are at this station nine holders—five in the new and four in the old works. One of the former is on the wire-rope system; all the rest are column-guided. Their combined capacity is 90,000 cubic metres, or nearly 3¼ million cubic feet. Outside the San Celso works there are two spiral-guided holders, each of 25,000 cubic metres, or 882,000 cubic feet, capacity. These large works, combined with the other stations, will in a few years be unequal to meeting the demands of the consumers, who at present number more than 100,000, and are increasing at the rate of 10 per cent. per annum. Consequently, new works are in course of construction to the north of the city; and when fully equipped they will have a producing capacity of 480,000 cubic metres (about 17 million cubic feet) of gas per day. The present consumption is 60 million cubic metres, or close upon 2200 million cubic feet, per annum. At the close of the inspection, the visitors were invited to partake of refreshments which had been hospitably provided in the meter-house, where Madame Lacombe joined the party, and added the charm of her presence to an act of hospitality which, it need scarcely be said, was fully appreciated.

The Dinner and Excursion.

The dinner of the Society, which took place at the Eden in the evening, was a brilliant function. The guests were received by the President and Madame Lacombe; while Mr. Edwin Bode, Assistant-Secretary of the Cie. L'Union des Gaz, represented the Company. Mr. John Black, the London Inspector, was also present. The hour fixed was "19.30"—in plain English, half-past seven o'clock; but it was "20" o'clock by the time all the numerous guests had arrived and been shown to their places under the personal supervision of the President and Mr. Bode. A goodly number of ladies attended the function. To say that it was "brilliant," is to inadequately describe it. It was characterized by the most generous hospitality; and it is only doing justice to its organizers—it is unnecessary to particularize them—to place on record the thorough success of the arrangements. A selection of music was played during dinner; and on the stage at the end of the hall, a few "turns" of the variety kind—a lightning artist and performing dogs and acrobats—took the place of the long, and sometimes tedious, speeches to which Englishmen are accustomed. Yet speeches were not wanting; but they were short and to the purpose. The President offered a few appropriate words of welcome, which were acknowledged by M. Coze, on behalf of the Société Technique, and by Herr Weiss for the Swiss Society—the latter inviting their Italian colleagues to join them at their meeting next year. Heer Bolsius added a few remarks for the Dutch Society. There was one quite novel feature of the function, and it was introduced by Signor Rebuffel, of Bologna, who proposed the health of the Perpetual President (Signor Bonn) and his daughter—a toast which was cordially received. The company separated shortly after eleven, in the confident expectation of having an enjoyable excursion the next day.

This expectation was fully realized. Whoever may have been responsible for the dinner and entertainment at the Eden on Tuesday, there was no doubt as to the Cie. L'Union des Gaz being the hosts on Wednesday; and right liberally they discharged their duties. They availed themselves of the contiguity of Milan to the beautiful Italian lakes to give their guests a treat which it might never be the good fortune of some of them to have again. It consisted in a trip to Pallanza, on the Lago Maggiore. A large party, including Madame Lacombe and several other ladies, left the Central Station by special train at 8.30 for Arona, whence a steamer (specially engaged and gaily decorated) conveyed them to the lovely Isola Bella, which is fitly characterized as the "pearl" of the lake. There the party landed, and spent about an hour in inspecting the venerable palace and beautiful gardens which are its chief attractions. From this lovely spot they went to Pallanza, where luncheon was provided in the Grand Hotel. After the repast, opportunity was taken by M. Coze to express his thanks to his *amis et frères d'industrie* for the opportunity which had been afforded to members of other societies to meet them in congress. They had, he said, been shown a fine Exhibition, had joined in some useful discussions, and had an interesting visit to works. Moreover, they had been shown a marvellous lake in the society of charming ladies. He drank to the *fraternité des gaziers entiers*. The President, in thanking M. Coze for his remarks, said he was there as representing the Cie. L'Union des Gaz. Unfortunately, no formal resolution of thanks to the Company was passed, though this was incidentally mentioned by one of the members of the Italian Society; but it may safely be said that only one feeling animated everybody, and it was that the comfort of the party had been studied in every particular. Pallanza was left shortly after four o'clock, under a perfect Italian sky; Arona was reached by half-past five, and Milan by eight. With much hand-shaking the company separated, looking forward hopefully to the renewal next year of many personal and professional acquaintanceships.

THE SUPERSESSION OF GAS BY ELECTRICITY,

FROM A LEGAL POINT OF VIEW.

By J. Duncan, M.A., LL.B., Barrister-at-Law.

Introduction.

The encroachments made by electric lighting upon the ancient domain of gas have not always been of such a salutary and permanent nature as to disentitle the suppliers of gas from claiming that their interest is sometimes identical with that of the public in the matter of superseding the old order for the new. It is now about a hundred years since gas was first used to light the streets of London; and it is only about one-fourth of this time since the more brilliant, if less steady, illuminant has endeavoured to oust her sister of light. At first the results were dazzling in the extreme; and the younger generation, eager for progress and newer things, welcomed the new discovery, sprung from they knew not where, as a heaven-sent messenger capable of turning night into the day.

Notwithstanding many commendations, however, it has been found that electricity is not the best method of lighting for all purposes. In the first place, it is more expensive; and consequently there must be some compensating advantage to outweigh this disadvantage. In addition, it is a flickering light, and therefore strains the eyes. When added to these two disadvantages there is to be considered an improvement on the other side—namely, the incandescent mantle—it is no wonder that electricity has been discarded in several cases, and gas has again been adopted. It was not very far from Fleet Street that the first public lighting with gas took place in London a century ago; and it is Fleet Street which has first returned to gas after having

wooed electricity for a period. The gas suppliers also point to the new Kingsway as a clamant exemplar of the superiority of gas over electricity; for has it not been lighted with gas from the outset? and it, too, the finest street in the world. Needless, therefore, to further justify, in the public interest, the statement of the case in favour of gas. The interest of gas suppliers can be best subserved by stating the duties that have to be observed by the electric undertakers and the local authorities vested with the responsibility of public lighting.

Legal.

There was only one local authority vested with this duty in 1833. Now there are five. The following is a list of these, taken historically, with the dates of their inception:—The parish, 1833 and 1894; the City of London, 1848 and 1898; the London Vestries (now the Metropolitan Boroughs, including the City of Westminster), 1855 and 1899; the urban district council, 1875 and 1894; and the rural district council, 1875 and 1894. This historical classification is not the most logical one; but it is the most convenient. In Anglo-Saxon times, the divisions of the kingdom were the tun (town), the hundred, and the shire. The tun was the unit of Saxon administration; and it, like the county and the kingdom, had a council or gemot of its own. Hence the names the tun-gemot, the shire-gemot or shire-court, and the witena-gemot or assembly of the wise men, now called the House of Lords. After the spread of the Roman clergy over the country, the civil pagan classification was overlapped with an ecclesiatical nomenclature, such as parish, diocese, and archbishopric. The tun in course of time lost its individuality, or was merged in the parish, and the tun-reeve, like the shire-reeve or sheriff, lost his ancient function as a magistrate. Hence arose the new unit of ecclesiastical jurisdiction which has withstood the unit of feudal jurisdiction—the barony. In 1833, when the Lighting and Watching Act (3 & 4 Wm. IV., c. 90) was passed, it became necessary for the Legislature to look around for a local authority or unit which should have control of the lighting of the district. It was by all means meet that Parliament should recognize the smallest unit as the fittest for the administration of the Act; and thus it was that the parish was singled out and endowed with the powers of lighting.

I.—The Parish.

Parish Meetings and Parish Councils.

By the Local Government Act, 1894 (56 & 57 Vict., c. 73), the parish council must be empowered by a parish meeting.

Section 1—(1). There shall be a parish meeting for every rural parish, and there shall be a parish council for every rural parish which has a population of 300 or upwards; Provided that an order of the county council, in pursuance of Part III of this Act, (*a*) shall, if the parish meeting of a rural parish having a population of 100 or upwards so resolve, provide for establishing a parish council in the parish, and may, with the consent of the parish meeting of any rural parish having a population of less than 100, provide for establishing a parish council in the parish; and (*b*) may provide for grouping a parish with some neighbouring parish or parishes under a common parish council, but with a separate parish meeting for every parish so grouped, so, however, that no parish shall be grouped without the consent of the parish meeting for that parish.

Parish Meeting may Adopt the Lighting and Watching Act, 1833.

Section 7—(1). As from the appointed day, in every rural parish the parish meeting shall exclusively have the power of adopting any of the following Acts, inclusive of any Acts amending the same (all which Acts are in this Act referred to as "the Adoptive Acts")—namely, (*a*) The Lighting and Watching Act, 1833 (3 & 4 Wm. IV., c. 90). (2) Where under the said Acts a particular majority is required for the adoption or abandonment of the Act, the like majority of the parish meeting, or, if a poll is taken, of the parochial electors, shall be required, and where under any of the said Acts the opinion of the voters is to be ascertained by voting papers, the opinion of the parochial electors shall be ascertained by a poll taken in manner provided by this Act.

The Lighting and Watching of Parishes Act in England and Wales, 1833 (3 & 4, Wm. IV., c. 90).

Adoption.

Section IV.—And whereas it is desirable to make provision for the lighting and watching of the several parishes in England and Wales, be it enacted that this Act, and the several provisions thereof, shall apply to, and may be adopted under and subject to, the regulations herein contained, by all or any or either of the parishes in England and Wales.

Two-Thirds Majority Required for the Adoption of Electricity.

Section VIII.—And be it further enacted that, if at any such meeting it shall be determined, by a majority consisting of two-thirds of the votes of the ratepayers present at such meeting, that the provisions of this Act shall be adopted, then and in such case such provisions shall from thenceforth take effect and come into operation in such parish, and it shall forthwith be determined that a certain number, not being more than twelve nor less than three inspectors, shall be elected to carry such purposes into effect, and the number of inspectors so determined upon shall be elected in manner herein mentioned.

Assessment for Lighting Rate.

Section IX.—And be it further enacted that the ratepayers of such parish shall, at their first meeting or at some adjournment thereof and so on from time to time in every succeeding year at a meeting to be called for that purpose in manner herein directed, fix and determine the total amount of money which the inspectors shall have power to call for in any one year in order to carry into effect the provisions of this Act, such sum to be raised in the manner herein directed, upon the full and fair annual value of all property rateable for the relief of the poor within such parish, such full and fair annual value to be computed according to the last valuation for the time being acted upon in assessing the poor's rate.

It will be observed that, although the inspectors have the power of levying rates, they do not have the power of borrowing money on mortgage.

Power of Abandoning Gas Supply Vested in the Parish Meeting only and not in the Parish Council.

Section XV.—And be it further enacted that notice of the adoption of this Act (or any part thereof specifying it), with the amount of the sum to be raised in the succeeding year and the number of inspectors to be elected by any parish, shall be forthwith given by the churchwardens for the time being of the said parish by affixing a notice of the same to the principal door of every church and chapel within the said parish or on the usual place of affixing notices relating to the parochial affairs of such parish, and in such case the provisions of this Act shall from thenceforth take effect and come into operation in such parish: Provided always that it shall be lawful for the inhabitants present at any meeting called in manner herein directed, at any time after the expiration of three years from the time when the provisions of this Act shall have been adopted, to determine that the provisions of this Act shall, from and after a day to be fixed upon at such meeting, cease to be acted upon, in which case, from and after such last-mentioned day, the provisions of this Act shall no longer be in force in such parish: Provided nevertheless that the provisions in this Act contained shall remain and continue in force for the purpose of collecting and receiving any rate which shall have been previously made; and if on the abandonment and ceasing to act upon the provisions of this Act there shall be any balance in the hands of the said inspectors after defraying the expenses incurred in carrying into effect the provisions of this Act, the said balance shall be paid over to the overseers of the poor of the said parish, to be applied in aid of the poor rates of the said parish.

It is not stated that a two-thirds majority is required for abandoning the Act, only for adopting it. It might be argued, however, that this was the intention of the Legislature, otherwise a bare majority might undo the vote of a two-thirds majority passed three years previously. There are no powers for enforcing that gas shall be continued for the above three years minimum—indeed, in the case of inability to pay, the Act would become inoperative mechanically. It is to be observed, however, that it is not the council, but the churchwardens, who have the power of declaring the rate to be levied; and presumably it would rest with them or the parish meeting to make the Act a dead letter, so far as gas is concerned, by refusing to vote the necessary amount at the annual meeting. Under the Municipal Corporation Act, 1882, it is not a disqualification for anyone connected with a gas undertaking to sit on a corporation and vote upon a contract in which his undertaking is interested.

Lighting Alone may be Adopted.

Section LXXI.—And be it further enacted that the powers of this Act may be adopted in any parish, either as to lighting or as to watching or as to lighting and watching, as may be deemed expedient, and that the provisions of this Act may be adopted in any parish so far as the same relate to lighting, although such parish shall be watched under, or by virtue of, any Act of Parliament passed for that purpose, and may be adopted in any parish, so far as the same relate to watching, although such parish shall be lighted under, or by virtue of, any Act of Parliament passed for that purpose.

No Second Meeting of Adoption within One Year.

Section XVI.—And be it further enacted that, in case any such meeting convened as aforesaid, or in case of a poll having been demanded as aforesaid, a majority of two-thirds of the votes as aforesaid shall not have decided to adopt the provisions of this Act, it shall not be lawful for the inhabitants to meet again in less than one year from the period at which such meeting shall have been so convened as aforesaid.

II.—The City of London.

In 1898, the Common Council took over all the duties of Lighting. These were contained in "An Act to provide for the . . . improvement of the City of London . . . and for the better lighting of the same, 1848 (10 & 12 Vic., c. 163.)

III.—The London County Council Area.

By the London Government Act, 1899 (62 & 63 Vic., c. 14), section 4, the powers of the vestries as to lighting streets were transferred to the boroughs, including the City of Westminster, within the area of the London County Council. These lighting powers had been vested in the vestries by the Metropolis Management Act, 1855.

Metropolitan Boroughs, including the City of Westminster.—By the Metropolis Management Act, 1855, section 130, every vestry and district board shall cause the several streets within their parish or district to be well and sufficiently lighted. . . .

By section 165, it is provided that in parishes where the Lighting and Watching Act, 1833, was in force at the passing of the Act, houses, buildings, and property other than land were rateable to the lighting rate at a rate three times greater than land.

By section 2, the government of the Metropolis was vested in vestries constituted by the grouping of parishes endowed with the power of sending up twelve vestrymen for every 1000 rated householders.

IV.—The Urban District Council.

By the Local Government (England and Wales) Act, 1888, section 100, urban authority means, until the establishment of district councils as aforesaid, an urban sanitary authority, and, after their establishment, the district council of an urban county district.

By the Local Government Act, 1894 (56 & 57 Vic., c. 73), section 24, it is enacted that urban sanitary authorities shall be called urban district councils, and their districts shall be called urban districts, and, further, that the expression "district council" shall include the council of every urban district whether a borough or not.

The powers of an urban authority to discard gas and adopt electricity are contained in section 161 of the Public Health Act, 1875. "Any urban authority may contract with any person for the supply of gas or other means of lighting the streets, markets, and public buildings in their district . . ."

By section 150, the same authority may require private streets to be properly lighted, and, by section 152, may declare the same to be public subject to an objection by a majority of the proprietors.

The Public Health Acts Amendment Act, 1890 (53 & 54 Vic., c. 59), section 41, provides that, where part III. of that Act is adopted, the above section shall be repealed and the following provisions shall be substituted in lieu thereof:—

(1) Whenever all or any part of the works mentioned in section 150 of the Public Health Act, 1875, have been executed in a street or part of a street under that section by an urban authority, and the urban authority are of opinion that such street or part of a street ought to become a highway repairable by the inhabitants at large, they may, by notice to be fixed up in such street or part of a street, declare the whole of such street or part of a street to be a highway repairable by the inhabitants at large, and therefore such street or part of a street as defined in the notice shall become a highway repairable by the inhabitants at large:

(2) Provided that no such street shall become a highway so repairable if within one month after such notice has been put up the owner or the majority in number or value of owners of such street by notice in writing to the urban authority object thereto, and in ascertaining such majority joint owners shall be reckoned as one owner.

By the Private Streets Works Act, 1892 (55 & 56 Vic., c. 57), it is provided that the urban authority may themselves undertake, in the first instance, the work contemplated by section 150.

Section 6 (1) of that Act provides:

Where any street or part of a street is not . . . lighted to the satisfaction of the urban authority, the urban authority may from time to time resolve, with respect to such street or part of a street, to do any one or more of the following works . . . that is to say . . . provide proper means for lighting such street or part of a street, and the expenses incurred by the urban authority in executing private street works shall be apportioned . . . on the premises fronting, adjoining, or abutting on such street or part of a street.

Reverting to section 161, it is further enacted, in paragraph 2, that—

Where there is not any company or person (other than the urban authority) authorized by, or in pursuance of, any Act of Parliament, or any order conferred by any Act of Parliament, to supply gas for public and private purposes, supplying gas within any part of the district of such authority, such authority may themselves undertake to supply gas for such purposes. . . .

The combined effect of these two sections is that an urban authority is authorized to light its own streets and, in the absence of a statutory gas company, to supply its own gas.

By section 163, the Lighting and Watching Act, 1833, is superseded by this Act, and the property previously vested in the inspectors under that Act thereupon becomes vested in the urban authority. By paragraph 3 of section 161, the Provisional Order is made subject to the terms of the Gas and Water Works Facilities Act, 1870.

By section 33 of the Local Government Act, 1894 (56 & 57 Vic., c. 73), sub-section 1, the Local Government Board may, on the application of the Council of any municipal borough, including a county borough, or of any other urban district, make an order conferring on that council, or some other representative body within the borough or district (among other things), any powers, duties, or liabilities of a parish council.

Private undertakers as well as local authorities may apply for Provisional Orders. In the former case, the application is to the Board of Trade; in the latter, to the Local Government Board. The Board of Trade will not grant a Provisional Order to a private undertaker to supply electricity without the consent of the local authority (Electric Lighting Act, 1888; 51 & 52 Vic., c. 12, section 1); and it is expressly stated that the grant of a Provisional Order does not constitute a monopoly. The grant of a Provisional Order to supply gas does not constitute a monopoly, but practically it is treated as such. Otherwise, however, in the case of electricity.

In London, for example, there were 17 instances of overlapping and competition in 1897. In six of these districts there were three different authorized suppliers of electricity.

In Ireland, an urban authority has similar powers as an urban authority in England, by sections 55, 80, and 81 of the Public Health (Ireland) Act, 1878 (41 & 42 Vic., c. 52).

In Scotland, the town councils acquire similar powers under section 21 of the Burghs Gas Supply (Scotland) Act, 1876 [39 & 40 Vic., c. 49).

In the rare instance of electric light being the first light introduced into a district, there would be no difficulty on the part of gas suppliers to obtain a Provisional Order with the consent of the local authority.

By the Municipal Corporations Act, 1882 (45 & 46 Vic., c. 50), it is provided as follows:—

136. (1) The trustees appointed or acting by or under any local Act of Parliament for the time being in force for . . . lighting or supplying with gas . . . may . . . transfer to the municipal corporation of the borough, with the consent of the council but not otherwise, all the rights, powers, estates, property, and liabilities for the time being vested in, or imposed on, the trustees under the local Act.

137. (1) Where at the passing of the Municipal Corporations Act, 1835, there was a local Act of Parliament for lighting part of a borough then incorporated, the council may make an order that any specified part of the borough not within the provisions of any such local Act shall, after a day fixed in the Order, be within those provisions as far as relates to lighting, or at any rate authorized to be levied for lighting.

138. Everything provided under any local Act of Parliament in force on the 20th of August, 1886, to be done exclusively by a part or limited number or class or description of the members of any body corporate named in the schedules to the Municipal Corporations Act, 1835, the continuance of which was not inconsistent with the provisions of that Act, and everything provided in any such local Act, to be done by the justices or by some particular class or description or members of such body corporate being justices at a court of quarter sessions . . . shall be continued thereafter to be done by the council at a quarterly meeting, or by any three of a committee of the council appointed at such a meeting.

V.—The Rural District Council with Urban Powers.

By the Local Government (England and Wales) Act, 1888, section 100, rural authority means (until the establishment of district councils) a rural sanitary authority, and after their establishment the district council of a rural county district.

Public Health Act, 1875.—(38 & 39 Vic., c. 55.)

Transfer of Power.

Section 163.—Where in any place which after the passing of this Act becomes constituted or included in an urban district, or which by virtue of any Order of the Local Government Board becomes subject to this enactment, the Act passed in the fourth year of the reign of King William IV., intituled "An Act to repeal an Act of the eleventh year of his late Majesty King George the IV. for the lighting and watching of parishes in England and Wales and to make other provisions in lieu thereof" has been adopted, the said Act shall be superseded by this Act, and all lamps, lamp-posts, gas-pipes, fire-engines, hose, and other property vested in the inspectors for the time being under the said Act shall rest in the authority having under this Act jurisdiction in such place.

[By Order.]

Section 276.—The Local Government Board may, on the application of the authority of any rural district or of persons rated to the relief of the poor the assessment of whose hereditaments amounts at the least to one-tenth of the net rateable value of such district or of any contributory place therein by order to be published in the "London Gazette" or in such other manner as the Local Government Board may direct, declare any provisions of this Act in force in urban districts to be in force in such rural districts or contributory place, and may invest such authority with all or any of the powers, rights, duties, capacities, liabilities, and obligations of an urban authority under this Act, and such investment may be made either unconditionally or subject to any conditions to be specified by the Board as to the time portion of the district or manner during, at, and in which such powers, rights, duties, liabilities, capacities, and obligations are to be exercised and attach: Provided that an order of the Local Government Board, made on the application of one-tenth of the persons rated to the relief of the poor in any contributory place, shall not invest the rural authority with any new powers beyond the limits of such contributory place.

Since the Public Health Act, 1875, it is enacted, by the Local Government Act, 1894 (Parish Council Act) (56 & 57 Vic., c. 73), section 24, that for every rural sanitary district there shall be a rural district council, whose district shall be called a rural district.

As to the Other Parts of a Rural District.

The Local Government Act, 1894 (56 & 57 Vic., c. 73), section 7, provides (sub-section) that from the appointed day in every rural parish the parish meeting shall exclusively have the power of adopting (among other things) the Lighting and Watching Act, 1833, and (sub-section 7) that when any of the adoptive Acts is adopted for the whole or part of a rural parish after the appointed day, and the parish has a parish council, the parish council shall be the authority for the execution of the Act.

Conclusion.

From the above review of the law applicable to the five authorities vested with the duty of public lighting, it will be observed that the parish cannot abandon gas lighting for three years after its adoption. But the adoption has to be by a two-thirds majority; and the discarding authority is not the council, but the parish meeting. With regard to the other four local authorities, they may discard at any time by a bare majority. In all five cases it is no disqualification for a voter upon a question of gas supply to be interested in the question.

As gas has entered on a new lease of life, it would be quite justifiable for those interested in it to use all the technical and legal weapons at their hands to stave off the too hasty abandonment of an old and trusted servant.

MODERN GAS FIRES AND OTHER HEATERS.

Preparations for the Winter Season.

PERHAPS of all the numerous directions in which gas is applied to the service of man, its use for domestic heating is, considering the extent of the field, the least developed. At the same time, the business in gas-fires is a large one; but it ought to be very much larger. Probably one reason why there has not been greater development in the dislodgment of the coal fire by the gas fire has been that gas supplying companies and authorities have not generally had recourse to the same methods in cultivating their adoption as have been applied in the case of the gas-cooker. A system of gas-fire maintenance has not yet become the rule among gas undertakings; but, from experience, we firmly believe there is a business to be done in this way.

However, season after season we find the makers of gas-fires and other heating apparatus doing their level-best to keep abreast of the requirements of the time; and to improve in the matter of both design and efficiency. It was charged against them in days now buried deeply in the past that their designers were lacking in idea, that they had apparently got into a rut from which only some great force could remove them, that the fires produced from their designs had a common affinity in external appearance—the same heavy shape and style, barren of all artistic merit. Go into the show-rooms of any of our makers to-day; and the old criticism would be a libel. Light, smart, and artistic are the productions for the best decorated rooms of the house; while for other rooms and purposes, where smartness would look almost grotesque amid more sombre surroundings, the heavier styles of earlier days are still most suitable. There is now a distinct appreciation of the fact that the fire that will do for one room will not necessarily do for another; and so for all purposes appropriately designed fires are to be found.

Another very general feature is the provision that has been made for easily, and without disconnecting from the service-pipe, keeping fires in good working order. Burners are now made loose, and can be removed and replaced by hand; and fire-bricks are also made detachable, and quickly renewable. It is also common now to find provision for the regulation of both gas and air supply, which is necessary where the constitution of gas varies, and to meet the widely varying qualities of gas and pressures in different parts of the country.

Several firms are well advanced with the special goods they are offering for the coming season; and points regarding them will be both interesting and serviceable, as gas engineers and managers will now be looking out for new styles for show-rooms purposes.

Messrs. John Wright and Co.

(Birmingham and London.)

It is always expected that in the advancing march of gas cooking and heating appliances for both domestic and industrial use, the productions of Messrs. John Wright and Co. will be in the front rank. This year again finds the firm with several important and new features. Possibly the two which will attract most attention in gas circles, are the new "Simplex" adjustable gas-burner, and the new "Wizard" slot gas-fire. Examining the former, it is seen that the burner is but a development, though a big one, upon the patent adjustable burner introduced by the firm last year. The remarkable feature of this appliance is that, by convenient means, one can adjust both the gas and air supply. This adjustment is right in front of the fire; and it can be regulated while the fire is burning. It is indeed a most accessible and efficient means of regulation. Accompanying this adjustable burner, the firm also emphasize the importance of their new special brick and fuel arrangement. The two features combined (applied to their latest fires, and applicable to almost all the other types) give extraordinarily good results, with the gas consumption cut down to a moderate figure. For example, a 10-inch fire gives a bright glow all over, with as little as 13 cubic feet of gas per hour. The new burner can be adjusted to work at any pressure, and with any quality of gas.

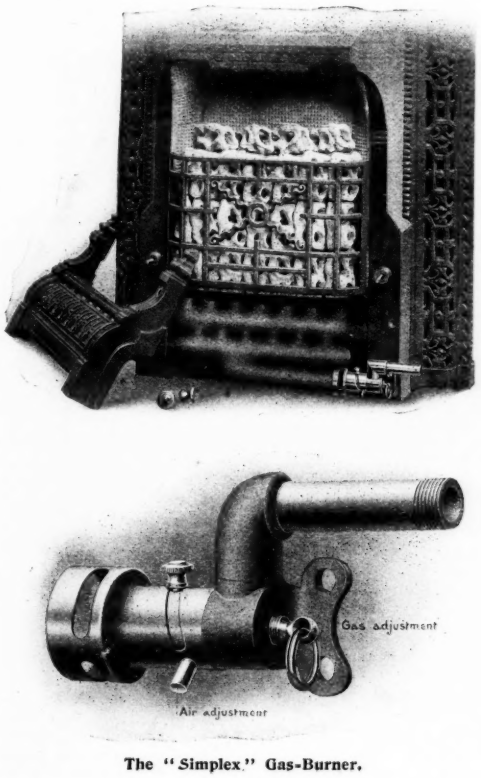
The "Wizard."

The "Wizard" fire, as the illustration shows, has a prepossessing appearance, and will be greatly admired, though it is only a "slot fire." It is the issue of progressive notions; and we see no reason why, as claimed by Messrs. John Wright and Co., the fire should not have a big future. It is a full-sized stove, yet obtainable at a minimum cost. As shown in the accompanying illustration, it is of a singularly attractive yet unobtrusive design, and will not be out of place in cottage or mansion. It may well be said to bear the same relation to the firm's other gas-fires as the slot cooker at present bears to the high-grade cookers. The high degree of efficiency of the stove, united to its economy of gas consumption, will undoubtedly commend it. This fire can be fitted with the new "Simplex" adjustable burner, and brick and fuel arrangement. It has been a motto for gas managers "One gas cooker to every house;" but with such gas-fires available, they must extend the motto to "One cooker to every house; and one gas-fire per room."

The "Counsellor."

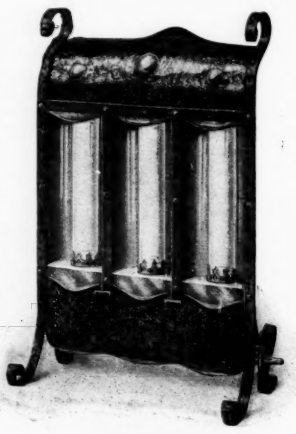
The "Viscount."

The firm are also introducing a new high-grade fire which they have titled the "Counsellor." It is of a very pleasing design. Then for use in the nursery, they have introduced an effective



The "Simplex" Gas-Burner.

type, which bears the title of "Viscount." In gas-heated steam-radiators, the firm are this season introducing one of single column pattern. Last, but not least, to notice is a novel and effective art stove, which is entitled the "Electra." It reminds one of the type of stove which the electricity people are now trying to push. It possesses the merits of being artistic, economical, attractive, and cheap; and it is manufactured entirely in armour-bright iron and copper, with luminous argand burners. It will be at once realized what a brilliant effect these burners will give, having the reflective powers of copper at their back. As shown in the accompanying illustration, it has three burners; fitted with patent duplex tap, which enables the centre, or two side burners, or all three, to be lit as desired.



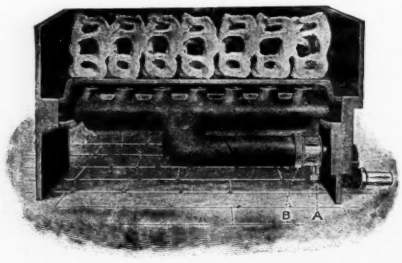
The "Electra."

Messrs. Wilsons and Mathiesons, Limited.

(Leeds.)

Among their latest gas-fire productions, this firm present some very attractive styles and features. The Wilson "W. D." gas-fire is one that they are particularly relying upon in the coming season. The casing has a clean, well-defined appearance; and it is suitable for almost any situation. With the gas and air properly regulated, the consumption of gas is moderate. For regulating the gas and air supply, the firm use (under special licence) Bray's patent adjustment, in which, by the aid of the thumb screw A, the gas-jet holes are diminished or opened; and by turning the collar with the milled edge B, which opens or closes the air-inlets, the air can be regulated. By these means, a perfect bunsen flame is obtained; and there is no smell or noise. The application of the adjustment (which will be fitted to most of the firm's fires and cookers) does not add to the cost. The burner is a loose one, and so it can be readily cleaned. The stove is finished in black enamel or aluminium paint; and has at the base a copper reflector, which adds a good effect when the fire is in use. The "Delft" fire has a charming appearance, with its Dutch-tiled semi-circular front. A special feature in the construction of this fire is that it is fitted with "S. M." ventilating-flues, in which are fitted "hit-and-miss" grates, so that the ventilation of a room can be regulated; thus preventing the feeling of dry air or stuffiness sometimes experienced when a stove is placed in front of a fire-grate opening. The firm acknowledge their indebtedness to the South Metropolitan Gas Company for suggesting this valuable and ingenious adjunct to gas-heating stoves, which, they are confident, will materially increase the comfort and the healthiness of heating by gas.

The Wilson "W. D." Gas-Fire.



Bray's Patent Gas and Air Adjustment.

Wilson "Delft" Gas-Fire
Showing "S. M." Ventilating-Flues.

Messrs. Parkinson and W. & B. Cowan, Limited.

(London and Birmingham.)

This firm are introducing several really new and artistic designs in gas-fires for the forthcoming season—those that attract most attention being the "Diadem," the "Emerald," and the "Amethyst." They all embody the latest improvements, with loose burner, &c. Two of them are suitable for use as interiors; and all are supplied in various finishes—including black, bronze, and coloured enamels of many tints. The novel feature consists of an ingenious contrivance for regulating the supply of gas to the nozzle, which has been devised to counterbalance the effect of different pressures and different qualities of gas. This device can be easily operated from the front without removing the burner; and it is made to act on each injector separately or both together.

The "Diadem."

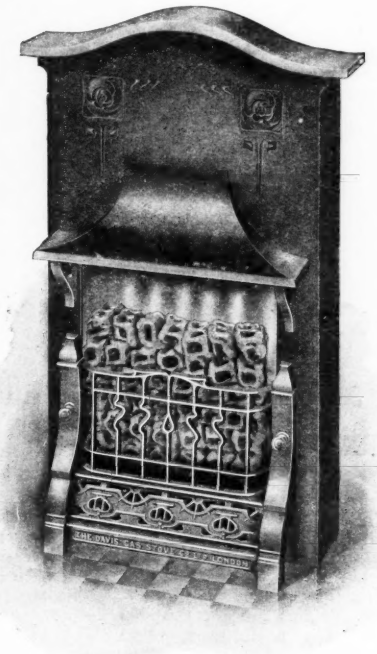
The "Comfort."

Simple provision is also made for regulating the air supply; and the adjustment is locked when once set, until further alteration may be rendered necessary by change of pressure or quality of gas. The "Comfort" is a chaste-looking fire, which can be fitted with a boiler burner when required.

Davis Gas-Stove Company, Limited.

(London, Luton, and Falkirk.)

This Company are to the front again with additions to the "Diamond" series of gas-fires, which were introduced for the first time last year, and we hear have proved very popular. In extending the range of these fires, there have also been improvements; and now the Company can say that, in these new productions, they have secured the highest efficiency (which means economy of gas consumption for the heating power realized) that they have ever succeeded in attaining. One outstanding feature of the new series of fires is an entirely new, detachable burner,



The "Diamond" Fire (No. 15).

The "Diamond" Fire (No. 16).

with gas and air regulators, which give the very highest measure of efficiency. This is the result of many experiments, and the reduction in gas consumption that has been effected, it is naturally hoped by the Company, will cause the new series of fires to make gas-heating stoves far more popular this season than they have ever been before. The loose burner fitted to these fires is detached in a few seconds; and the process of cleaning, when necessary, is a matter of the greatest possible ease. The burner operates quietly, and does not light-back. The designs (as the illustrations show) are pleasing; and purchasers, we understand, will find the prices very reasonable.

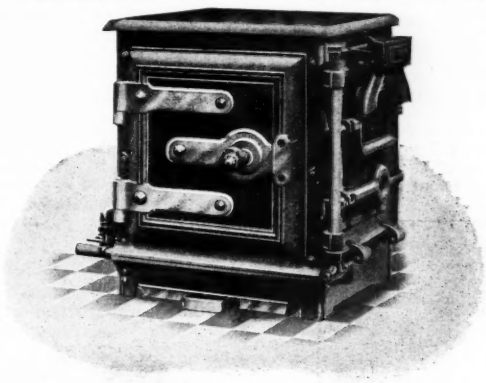
R. & A. Main, Limited.

(Falkirk, London, &c.)

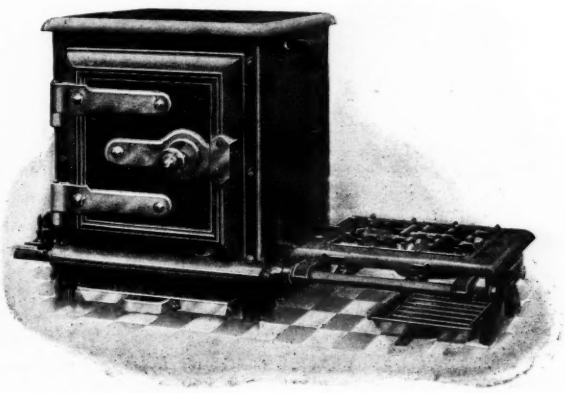
The "Winchester" and "Westminster" gas-fires are typical of the most up-to-date designs in gas-fires of Messrs. R. & A. Main, Limited. There is admirable taste about them; and they certainly lend themselves to the finest finishes. Economy and efficiency are pointed out as especially commending attributes. The details of construction show that the firm have ever-present the necessities of the times. Among other things, both burners and bricks are removable from the front to facilitate adjustment and cleaning. On account of its durability, the Company recommend the porcelain enamel finish, which in the long-run is found to be most economical. In addition, however, the fires are finished in fine cast, berlin black, electro bronze, and armour bright. The "Oxford" reflector stove is constructed in the usual manner; and the design is one that arrests the eye. We learn that

"Winchester" Gas-Fire.

"Westminster" Gas-Fire.



The "Main" Gas-Cooker, with Folding Hot-Plate.
(Hot-Plate raised.)



The "Main" Gas-Cooker, showing Hot-Plate in Use.

the "St. Mungo" gas-heated steam radiators (in both plain and ornamental patterns) have been in good request. Since this pattern was introduced, the Company have considerably improved it; and every radiator is now turned out with a cast-iron base and a nickel-plated air-valve. What is known as their "No. 351" water-heater, it is interesting to hear, has been very largely exported to the Colonies and South America. Attention is also directed to the "Main" range cooker, which is specially suitable where space cannot be found for the ordinary gas-cooker, not to speak of the fact that, being fixed inside a chimney, there is full ventilation and all the fumes are carried into the open air; thus preventing any possible chance of the atmosphere being vitiated. When not in use, the hot-plate is folded up against the side of the oven. The oven is enamelled inside, is double cased and in construction is equal to a first-grade cooker.

Carron Company.

(Carron, N.B.)

The range of the gas-fire patterns of the Carron Company has been extended by several additions; and the new ones are exceedingly choice. The "Balmoral," the "Windsor," and the "Osborne with their removal burners and fire-bricks, are examples; and they are supplied in no less than eight varieties of colour of majolica porcelain enamel, as well as in various bronze and armour bright finishes. But the "Crystal Light" is the very latest production. It is a fire of charming exterior; and in this case too the burners and bricks are removable for cleaning purposes. The finishes already mentioned apply to this fire. It will be a popular one. A serviceable fire is "No. 512," which is made to fit into existing fireplaces, and is supplied in three sizes—14, 16, or 18 inches. The Carron hygienic induction condensing gas-stove is an appliance that has been constructed on scientific principles; and regarding it the Company supplies the following description:

The "Crystal Light."

The action of this apparatus is caused by the hot gases which emanate from the point of ignition, after flowing into a chamber where they expand, being conducted down cast-iron tubes on each side, where, on arriving about midway, they are partially condensed or turned into vapour. The liquid, after passing down into the base of the apparatus, is carried through a small aperture into a receptacle placed for the purpose of receiving it. The vapour is induced through smaller tubes on each side to the upper part of the apparatus, where it comes into contact with the hot gases, and mixing with them finds its way among all the particles, so as to fully saturate them, expands, and increases the expansive force, which causes the condensation, and vaporization in the side tubes.

"Carron" Condensing Gas-Stove.

For Existing Fire-Places.

The Company are also putting on to the market a new gas-heated steam radiator, made, in plain and ornamental design, in three sizes—27 inch, 33 inch, and 39 inch. They are stocked in three colours —black, chocolate, and green.

Imperial Stove Company.

(Leamington.)

This Company have several new designs for the season, and prominent among them is a stove suitable for a bye-product of gas manufacture. It is a handsome anthracite stove, which also serves exceedingly well when the fuel used is ordinary gas coke. The door is panelled with mica, which throws off a good heat, and imparts a bright and cheerful appearance to the stove. They are also making a series of gas-heated steam-radiators of particularly smart exterior—plain and ornamental; the latter being especially chaste in design. The "Imperial" cooker, fitted with the "Cyclone" patent hot-water circulating arrangement is, we are informed, proving a great success. The large variety of heating-stoves now made by this Company are all being fitted with adjustable nipples, and with burners removable from the front—a feature that is a great boon, when adjustment is required in consequence of varying qualities and pressures of gas.

New Model "Syphon" Radiator.

Messrs. S. Clark and Co.

(Canonbury Road, N.)

The well-known "Syphon" radiators of this firm are ever popular. A new model has been produced this year, with five columns, for heating a space 13 ft. by 13 ft. It takes up a small amount of floor area; its width being one 15 inches by 13½ inches, and 32½ inches high. It is very attractively decorated; and, considering its compact character, it does excellent heating work. It is finished in japan, relieved with copper bronze; and is fitted with polished copper reflector, porcelain tiles, and coloured glass screen in front.

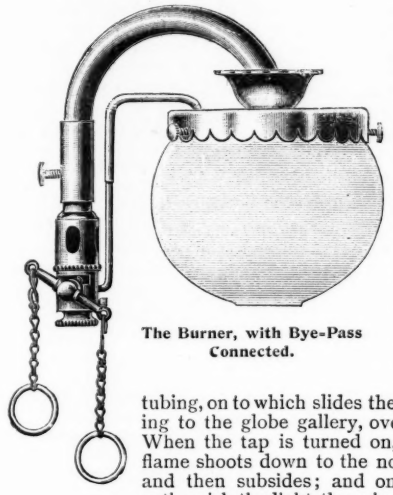
THE "CALYPSO" INVERTED GAS-BURNER.

It cannot be said that there is any lack of choice in inverted gas-burners at the present day; but there is this to be said, that the market for them is large. About most of those to which we have recently had an opportunity of drawing attention, there are distinctive features that will commend themselves variously to gas engineers and managers; and there is little doubt that the "Calypso" burner now to be described and illustrated will also find favour for the convenience it offers, for its strength, and for its efficiency. It is a burner that can be adapted to existing fittings without any special connections. That in itself is a consideration; and the make of the burner (as the illustrations show) removes completely the products of combustion from the inlets of the primary air supply. One thing of special importance that the makers have sought to obtain is the complete mixture of the gas and air supply before reaching the point of combustion; and a mere glance at the construction of the burner indicates that they could hardly fail in succeeding in this.

Double Bracket Light (showing Gas-Regulating Screws at Bottom of Burner).

In the first place, the air-inlets are controlled by a collar, which, not being in the line of the heated products of combustion, can be operated by hand while the burner is in use. The bunsen tube rising from the gas and air chamber is contracted in its central part, but broadens out to its full diameter at the top. Over this the long curved arm is slipped, and is held in position by a set-screw, which enables the burner to be fixed in any direction. It will thus be seen that the gas and air are first compressed in the bunsen tube, and then expand again in the curved tube in which the mixture has a considerable travel, and where it meets with increasing heat as it passes along. Under such conditions, an intimate mixture must be a certainty. On this point, it is interesting to observe how the incandescence of the mantle increases in intensity after the first two or three minutes of lighting. The curved tube carries the globe support; but there is no provision on the nozzle for the mantle. This is supported by an enamelled metal cup, which is held in position by the same screws that fix the globe. This cup holder permits of the use with the burner of any make of inverted mantle. Occasional attention to the gas-nipple makes all the difference in the performance of an inverted burner, as it does in the case of an upright one. Between the mixing chamber and the point of combustion, there is nothing whatever to impede the flow of the mixture, and so nothing

whatever that can cause any depreciation of the flame value. Therefore, by loosening the screw fixing the curved arm to the bunsen, the arm, mantle, and globe complete can be lifted off, access obtained to the nipple, and any dust that has lodged there can be at once removed. An excellent flame is obtained; and a test made in London by a well-known firm of lighting engineers, gives the illuminating power at 72 candles, with a consumption of $2\frac{3}{4}$ cubic feet of 16-candle gas. Of course, in the test there was the careful regulation that lighting experts would naturally make. But the figures mean that the efficiency, under the conditions of the test, was about 26 candles per cubic foot of gas consumed. The burner is also made in the bijou type, with or without bye-pass, as in the case of the ordinary burner.



The Burner, with Bye-Pass Connected.

The bye-pass arrangement is quite independent of the burner. Its seat forms a junction piece, with the gas-control cock, between the fitting and burner; and when this is applied, the ordinary tap remains constantly open. The gas-cock can be had for operation by an arm or lever and chains as preferred. From the junction-piece runs vertically a short length of fine tubing, on to which slides the horizontal arm leading to the globe gallery, over which it just laps. When the tap is turned on, a momentary jet of flame shoots down to the nozzle, ignites the gas, and then subsides; and on turning the tap to extinguish the light, there is a repetition of the jet of flame, and the bye-pass is restored.

A further serviceable variation in the bottom of the burner is a neat arrangement of gas-regulator. A small connecting-piece to attach to the gas-fitting, carries at its side the bottom part of the burner and the nipple. A screw, passing in at the base, has a cone-shaped head, terminating almost in a needle point. The under part of the nipple cap is also hollowed out cone shape, so that, as the screw is turned upwards, the gas-way is lessened; as it is turned downwards, it opens. By it, the gas to each burner can be regulated to a nicety. The regulating-screws are seen in the illustration of the double bracket light; and with these double, or other cluster, lights the regulator can be used to extinguish (as the case may be) one or more of the lights without interfering with those required to be kept alight. Connecting pieces are also provided by which the burner can be applied to pendant clusters.

We are asked to mention that Messrs. J. & W. B. Smith, the General Incandescent Company, and Messrs. W. H. Dixon and Co. (Hull) are making a speciality of the burner; and most of the wholesale houses are also supplying it.

NEW CATALOGUES.

In recent issues of the "Journal," there have been many references to new burners and lamps that have been prepared for the approaching lighting season; and within the past week various lighting appliance firms have favoured us with some profusely illustrated catalogues, which should be scanned by all gas managers. Many a useful hint and suggestion may be gleaned by keeping up a close acquaintance with what the manufacturers of fittings are doing. Some of the catalogues that are now issued are almost works of art; and certainly they illustrate the very remarkable advance that has been made in the past decade or so in the character and design of fittings, and in the efficiency of gas lamps and apparatus.

Messrs. William Sugg and Co., Limited, send quite a selection of catalogues (Nos. 10, 10A, and 11); and to a few of the leading specialities attention may be drawn. There is quite a store of technical information and illustration in list No. 10, which deals with general high-pressure gas lighting for both indoor and outdoor purposes, with special reference to the lighting of shops, warehouses, workshops, railway stations, &c. The Direct-Action Hot-Air Engine Gas-Pressure Increaser is specially suitable for small installations, for shops, hotels, &c.; and the Gas-Engine Pressure-Increaser for larger installations. For use in factories and workshops, where overhead shafting is employed, there is a special form of apparatus—a belt-driven gas-pressure increaser; the advantage being that the cost of driving is very small. With regard to lamps for high-pressure gas lighting, the "Newark" as well as the "Belgravia" demand notice. Both of them give splendid results, are being extensively adopted, and possess the advantage that the glass can be cleaned and the lamp re-mantled without the necessity for lowering the globe.

List No. 10A continues interest in high-pressure gas incandescent lighting, but more particularly in connection with the lighting of streets, large open spaces, markets, &c. For positions where there is great vibration, the "Devonport" lamp, with its tubular steel spring anti-vibrator, has been specially devised, and is being rapidly substituted for other lamps which have not its advantages. In the saving of mantles, and consequently in the reduction of maintenance, it gives results never before attained by the firm. It is quite evident by the large number of important installations already carried out that high-pressure incandescent lighting has come to stay. Judging by the list of places where the firm have made installations, the system is becoming quite ubiquitous; and it is rapidly increasing in favour among public authorities and private enterprises. Attention is also claimed by the "Windsor" lamp, which is supplied with a variety of fittings to meet varying opinions and requirements. The form for columns which the firm strongly recommend is that fitted with William Sugg's patent combined cast-iron base and ball trap door. The ball trap door avoids the extra consumption of gas caused by the use of a flash-light, which over a district, of course, amounts to something very considerable per annum. Further, the cast-iron base gives the lamp great rigidity; and the saving of mantles is very noticeable. The "Windsor" lamp, in its various forms, is represented by a use of 150,000 at the present time, in the United Kingdom and abroad.

List No. 11 covers a wide range of fittings and lamps for use with gas at the ordinary pressure. These include lights for domestic use, for indoor and outdoor shop lighting; and for the lighting of factories, goods yards, &c. Of course, many of the lamps shown, notably the "Chertsey," the "Newark," and the "Belgravia" are old and popular friends.

We have also received from the New Inverted Incandescent Gas-Lamp Company, of Farringdon Avenue, a catalogue of their "Nico" inverted incandescent gas burners and fittings for 1906-7, which cancels all previous lists. This burner was the subject of an illustrated article in the "Journal" as recently as the 14th ult.; and therefore it is unnecessary to say more about it now. It may, however, be remarked that the fittings illustrated are of such a varied character—from simple design to highly ornate patterns—that there are certain to be found some among them to suit every purpose and every taste. There are globes, too, of all conceivable shapes and colours. For outside or inside lighting of shops, warehouses, factories, public buildings, &c., there is the "Nico" cluster lamp; and another form illustrated in the catalogue is the "Porch" lamp, which is claimed to be the neatest and most effective lamp of its kind, and to give a light of 65-candle power, without a shadow below, for a gas consumption of 3 cubic feet per hour.

Messrs. Falk, Stadelmann, and Co., of Farringdon Road, are issuing a supplementary gas-fittings list (No. 246), the range of lighting media covered by which is not claimed to be exhaustive, as it is merely an extension of existing series. Special attention is, however, paid to inverted burner fittings; and the list embraces a considerable selection of graceful and novel designs. The application of the "Central" adjustable pendant (which has already been noticed in the "Journal") to an augmented range of suitable fittings is shown. A novelty is included (in respect to silk shades for inverted burners) in the introduction of a protection glass supported by an inner wire ring, which, it is claimed, not only protects the silk from scorching or burning, but also effects a material increase in the light. There are also several innovations in incandescent arc lanterns. The "Pharos" lamp can now be supplied with a parabolic reflector; thus rendering it eminently suitable under conditions where a strong light is required to be reflected in one particular direction, rather than a more general distribution. Then there is the "New Pharos," which, so far as construction and general design are concerned, is identical with the "Pharos" lamp, except that it is fitted with a new patent globe, enabling the usual copper cup to be dispensed with, and thus enhancing the appearance and rendering the lamp practically shadowless. A limited range of lanterns is introduced specially constructed for high-power burners, such as the "Verax," "Block Light," &c. A smart medium for interior shop lighting is the "New Lunar" four-light incandescent lamp. This has a heavily nickel-plated copper casing—the burner body and mounts being also nickel plated *en suite;* and, having regard to its compact and handsome appearance, together with its high lighting efficiency—500-candle power, it is said, with a consumption of 17 cubic feet per hour—it merits consideration. There is a series of lanterns specially constructed for inverted burners suitable for either shop interior or shop front lighting, and for exterior illumination generally. To attain efficiency with inverted burners under such conditions, necessitates a lantern with structural qualifications to suit the peculiar nature of the burners in question; and these qualifications Messrs. Falk, Stadelmann, and Co. claim that the "Radium" and "Vesta" inverted lamps possess. The "Radium" is made in two forms, for exterior and interior lighting. For the former, the lamp is constructed so that the bunsen tubes are situated on the outside of the casing, while at the same time thoroughly protected by a wind-proof shield. This is said to ensure a continual supply of perfectly fresh air reaching the mixing-chambers, since the flue conducting and dispersing the heated products of combustion is quite independent. The indoor lamp is built upon the same principle, but is more decorative in design. The "Vesta" inverted lamp was illustrated and described in the "Journal" for the 4th inst.

A COMPARISON OF HORIZONTAL, INCLINED, AND VERTICAL RETORTS.

A Paper Contributed in Competition for the Italian Gas Society's International Prizes.

The first subject selected by the Italian Gas Society (whose annual meeting was held in Milan last week) for their international competition, was very naturally and properly on the present state of carbonizing systems, and the preference to be given either to horizontal, inclined, or vertical retorts. Both the technical and the economical advantages of each system were to be taken into consideration, and also the suitability of each for large, medium, and small gas-works. Only one paper on the subject was submitted, the author of which wrote in German, and chose for his identification motto, "In Hope of Success." We give the following fairly full translation of his contribution.

The author bases his paper on the gas-works of Holland, where there are, he says, 106 gas-works, of which only 16 small ones are in private hands. There are eight works supplying towns with more than 50,000 inhabitants which he classifies as large ones. The second category of medium-sized works consists of 38 for towns of over 10,000 inhabitants, and 30 for places above 5000 inhabitants. Lastly, there are 30 works for populations of less than 5000; and these are the small gas undertakings. For the large works, he submits a scheme of: (I.) Inclined retorts; (II.) horizontal retorts with charging and discharging machinery; and (III.) vertical retorts. The method of heating the retorts is the same for all the systems—at least, for large works, only regenerative furnaces are adopted, the advantages of which, as compared with semi-regenerative or direct-fired beds, are well known. It is true that the regenerative system costs more; but there is less consumption of fuel, greater output of gas consequent on more regular distribution of heat, and longer life of the settings.

The ever-increasing demands for gas of late years have led to a desire (1) to produce a larger amount of gas on a more restricted area; (2) to reduce the number of retort-house workmen, in consequence of continuous increases of wages; and (3) to facilitate the hardly healthy work in the heat and dust of the retort-house, and to become more independent of the workmen. The three solutions of these problems are inclined retorts, machinery equipped horizontal retorts, and vertical retorts. The only question for large gas-works is which of these three systems is to be preferred. The author gives a design for each system, showing the site and the area required, and enumerating, from his neutral point of view, the advantages and disadvantages of each. [A note in the printed copy of the paper explains that the designs referred to are too large and complicated to be reproduced at present, but will be published in the "Minutes of Proceedings" for 1906. We give, however, a comparative table of the author's results and estimates for each system.]

I.—Inclined Retorts.

The development of this system is to be found recorded in technical literature. In England, Murdoch experimented with an inclined retort; and Brunton, in 1818, patented the principle of it. After the work of Coze in 1884, great practical progress was made. The good reputation that inclined retorts have is above all due to the system of regeneration, because, after the improvement of producers, success in uniformly distributing the heat in retorts up to 6 metres (about 20 feet) long was achieved, and rendered good working possible. The following figures give a general idea of the distribution of the temperature in an inclined retort 4·50 metres (about 14 ft. 9 in.) long, at the end of a six-hour charge, in comparison with a 3 metre (about 10 feet) horizontal retort:—

Temperature of Inclined Retort, 14 ft. 9 in. long.

Middle of retort	1030	1020	1040	Degrees Centigrade.
Top end	955	985	985	
Bottom end	880	885		

Temperature of Horizontal Retort, 10 feet long.

Middle and back part of retort	1000	1020	Degrees Centigrade.
	1010	1020	
Front part	980	960	

If carefully constructed with only the best material, there is no need to fear any great weight on the front part of the settings, and with regular heating the retorts behave just as well as in old horizontal beds; also any considerable sinking of the retorts, such as to impede the discharging, is excluded.

Advantages.

The great advantages of these retorts are—

(*a*) *Less Cost of Labour.*—To make a comparison, we give the cost per ton of coal carbonized for each system and for horizontal retorts worked by hand.

The capacity of the 15 beds shown by the author on his design is 173 metric tons, or about 170 English tons. This tonnage gives 48,440 cubic metres of gas (about 1,710,700 cubic feet). To produce the same amount of gas with horizontal beds of eights, 3 metres (10 feet) long, if each retort carbonized 14·76 cwt. per day in five charges at a make per metric ton of 280 cubic metres (or 10,047 cubic feet per English ton), 29 beds would be required. The cost of carbonizing (details of which are given), under the same conditions as for the inclined retorts, would be 436·30 lire. This, divided by 173 tons, gives 2·52 lire (say, 23·89d.). To obtain such a result, the conditions must be more favourable than usual, for the actual results of horizontal working per ton of coal carbonized have been for the years 1900 and 1901, 2·98 lire; for 1902, 2·88 lire; and for 1903, 2·72 lire. The cost of working with inclined retorts is 0·98 lire per ton (say, 9·29d.), including coal conveying. The saving in labour by inclined retorts compared with horizontal retorts is, therefore, equal to 61·1 per cent.

(*b*) *Greater Make of Gas over Less Area.*—This is of great importance, especially where reconstruction is to be carried out on the same site to increase the output of gas. Compared with hand-worked horizontal retorts, we have—

Covered area (with coal-stores) for 29 horizontal beds, 2552 square metres (27,510 square feet).
Make of gas per square metre (10·76 square feet) per day, 19 cubic metres (67 cubic feet).
Covered area complete for 15 beds of inclined retorts, 1213 square metres (13,057 square feet).
Make of gas per square metre per day, 40 cubic metres (1413 cubic feet).
Saving in covered area compared with horizontal retorts, 52 per cent.

(*c*) *Less Dependence upon Workmen*, in consequence of their fewer number. Other advantages are easy scurfing of retorts, production of larger pieces of coke for the manufacture of water-gas, and less amount of graphite, &c.

Disadvantages.

Coming, now, to the disadvantages of this system—

(*a*) *Greater Cost of Plant.*—The greater cost of plant ought to be compensated for by the lower cost of working. A comparison of the cost of the different systems is given in the table. From this, the cost of retort-plant per cubic metre of gas can be calculated. The buildings should be amortized in 40 years; the ironwork and coal-plant in twenty years; and the interior of the beds in five years—assuming a working year of 200 days and a life of 1000 days.

Buildings, chimneys, &c., 125,600 lire	Yearly charge, lire	6,346
Ironwork and coal plant, 209,800 lire	,, ,,	15,436
Internal repairs, 15 beds at 18,000 lire, 270,000 lire	,, ,,	60,650
	Total yearly charge, lire	82,432
Wages of 200 days' working, 20 stokers	lire	55,202
Cost of repairs		15,000
	Total, lire	152,634

Cost of retort-house working, including wages, per 1000 cubic metres of gas = 15·76 lire.

Comparative figures for hand-worked horizontal retorts are—

Buildings, chimneys, &c., 104,000 lire	Yearly charge, lire	5,254
Ironwork and coal carriage, 103,000 lire	,, ,,	7,580
Internal repairs of the beds, 200,000 lire	,, ,,	44,926
	Total yearly charge, lire	57,760
Wages of 200 days' working		97,600
Cost of repairs		15,000
	Lire	170,360

Cost of retort-house working, including wages, per 1000 cubic metres of gas = 17·58 lire.

(*b*) *The Drawback of Dirty Matter*, which is formed while the retorts are open: At charging, on account of the immediate combustion of particles of carbon; at drawing, owing to the current of air passing through the retort, because it is almost always necessary to open the top lids to assist in the discharging. The inclined position of the retorts has the effect of producing a large amount of tar. This inconvenience can be remedied by extending the time of carbonizing, or by keeping the lower part of the retort hotter. But the frequent stoppages of the ascension pipes resulting from this, do not allow of a high temperature throughout. The appearance of the discharging side of the retorts is never satisfactory, because the mouthpieces always contain tar, which burns during the draw, and produces smoke. This inconvenience is specially noticeable where the works are in the neighbourhood of houses through the extending of towns.

(*c*) *Irregular Charging of the Retorts.*—This inconvenience is of particular importance with very long retorts—for example, those of 6 metres (20 feet). Several qualities of coal during carbonization slip down, giving a less yield of gas, and making the discharging more difficult. The inconvenience is less with shorter retorts, for which reason we have chosen those of 4·50 metres (14 ft. 9 in.) long for our scheme. But also with these shorter retorts the quantity of the coal depends on its quality, the size of the pieces, moisture, &c.; and the retorts in the different tiers are charged differently according to the varying speed of the coal. The ability of workmen can only partially remedy this defect.

A few other general observations must be made: As regards the quality of the gas, we have not been able to ascertain any appreciable difference compared with horizontal retorts. From the same qualities of coal, and under the same conditions, several

samples of gas were taken at exactly the same times during the six hours from the ascension pipes of the two systems, and the average results from the analyses were as follows:—

Volume per Cent. in Ascension Pipes.

	Inclined Retort.	Horizontal Retort.
Carbonic acid	1·7	1·7
Heavy hydrocarbons	3·7	3·3
Oxygen	0·1	0·4
Carbonic oxide	6·7	6·6
Light carburetted hydrogen	32·0	32·8
Hydrogen	52·2	50·1
Nitrogen	3·6	5·1
Sulphuretted hydrogen	1·17	1·08

The analyses give a rather better result for the inclined retort. But the number of working days of the horizontal retorts was 820; whereas that of the inclined retorts was only 400.

The question of heating in general is almost independent of the position of the retorts. It is often said, both as regards inclined retorts as well as verticals, that the heating is more economical for horizontal settings. But in our opinion this is chiefly due to the better construction of the producers; and the amount of coke required for heating depends in great measure on the quality of the coal, and on the surface of the retorts which have to be heated. In actual working, an average of 15 per cent. of the weight of coal is desirable, always supposing that the positions of the dampers and the conditions of draught are regular. Some data of a setting in good working may be of use:—

Gas from the Producer Taken above it.	Combustion Gas from the Side of Lower Retorts.	Temperature of the Passages.	Chimney Draught in Millimetres of Water.
CO_2 7·6	16·1	No. 1. Black.	16
Heavy hydrocarbons 0·0	..	,, 2. Dark red.	10
O_2 0·0	1·9	,, 3. 1454° F.	9
CO 20·8	0·2	,, 4. 1634°	7
CH_4 0·5	..	,, 5. 1778°	4·5
H_2 0·6	..	At the top of the retorts 2156°	0·0 [2·5 mm. = $\frac{1}{10}$th of an inch.]
N_2 70·5	81·8		

Evaporation of Water.

Ash-pan (under the fire-bars) . . 348 litres (76·59 gallons) per 24 hours.
Steam generator (near the chimney) 345 ,, (75·92 ,,) ,, ,, ,,

Total . . . . 693 litres (152·52 gallons), or 51 per cent. of the coke used for heating (without clinker).

Working a bed with a steam generator, the consumption of water in the ash-pit will be 33 per cent. of the coke used for heating; but this renders the clinkering much more difficult.

II.—Horizontal Retorts with Charging and Discharging Machines.

Another improvement applied to the retort-house, to make it less dependent on workmen, and to carbonize a greater quantity of coal on the same area and per man employed, is the adoption of charging and drawing machinery. The system began by imitating the old working by hand with mechanical movement. In the more notable of the systems used to-day (Arrol-Foulis, West, De Brouwer, and that of Paris), which enter into consideration for large gas-works, the coal is thrown into the retorts in such a way that, by the successive and gradual slowing down of the speed of the mechanism, the distribution of the coal is effected uniformly throughout the whole length of the retort. As there are often two benches of horizontal retorts, 3 metres (9 ft. 10 in.) long, set back to back in the same house, the application of machines has suggested combining the two retorts into one of 6 metres long which carries with it the advantage of leaving all the other dimensions of the retort-house the same. As regards the discharging, the coke is now generally pushed from the retort, instead of being pulled out as before. Carbonization in these longer retorts is therefore identical with that in shorter horizontal retorts, and also with that in inclined retorts; the quality and quantity of the gas are the same. What one considers principally is the economy in labour, counterbalanced by the greater expense for the machines and for motive power. Other minor advantages are: Less time in making the charge, hence less loss of gas; more uniform charges; less damage to the retorts during charging.

For inclined retorts, we gave the expense for fifteen beds of nines, including building, repairs, working, &c., and we now give the similar figures for horizontals working with machines:—

Cost of Horizontal Retorts with Machines.

	Lire.
Cost of building, 120,000 lire, to be amortized in 40 years, yearly charge	6,062
Ironwork and coal plant, 198,200 lire, to be amortized in 20 years, yearly charge	14,584
Charging and discharging machines, 56,000 lire, to be amortized in 10 years, yearly charge	6,904
Internal repairs, 12 beds at 19,000 lire = 228,000, to be amortized in 5 years, yearly charge	51,214
Total yearly charge	78,764
Labour for a year for an average of twelve men	42,706
Cost of repairs	20,000
Total	141,470

Cost of retort-house working, including wages, per 1000 cubic metres of gas = 14·62 lire.

Comparing this result with the complete cost per 1000 cubic metres of gas found for inclined retorts, 15·76 lire, and for horizontal retorts worked by hand, 17·58 lire, it will be seen that the system of horizontal retorts with machines gives more economical results. We observe, however, that the machines considered in our scheme are very simple and cost little. Naturally, the price of more complicated machines, as, for example, those with automatic carriage of coal (Foulis, West, and Paris machines) is higher in proportion, and they also require a greater amount of motive power. Our machines have two motors of 8 and 4 horse power, and the Paris ones two motors of 18 and 12 horse power. Moreover, the kind of motor is of importance. Electrical motors have greater advantages; but in small towns where there are no central electrical stations, the gas-works would have to produce their own current, involving considerable increase of expenditure, especially in small works. Adopting instead hydraulic apparatus, the necessity of having a compressor in the works is also an inconvenience. In our statement of cost, we have always added the cost of the consumption of power to that of repairs. Separately, the cost of electrical working is—

	Lire
For coal and coke conveying per 1000 tons, about 300 kilowatt hours	48
For driving the machines ,, ,, ,, 150 ,, ,,	24

With charging-machines, it is convenient to work with larger quantities of coal per charge and per retort than when the retorts are worked by hand. It is for this reason that, in the comparative table, four charges per twenty-four hours are allowed for in the case of horizontal retorts, and five charges for the inclined retorts, and for the horizontal retorts worked by hand; the charges being smaller. The amount per metre-run and per twenty-four hours is, however, very nearly the same—

A horizontal retort, 6 metres long, carbonizes per metre-run in 24 hours	280 kilos. (5·51 cwt.).
An inclined retort, 4·50 metres long, carbonizes per metre-run in 24 hours	289 kilos. (5·69 cwt.).
A horizontal retort, 3 metres long, carbonizes per metre-run in 24 hours	250 kilos. (4·92 cwt.).

In small existing gas-works, there is sometimes usefully adopted a scoop hung from a guide (Eitle, Thiele), particularly in cases where at least three men are not to be found at the same time in the retort-house, and therefore where the usual method of charging with a scoop cannot be adopted. Fastening this scoop to a guide enables one man, with the aid of tackle, to charge the retort. An advantage of this arrangement is that the floor of the retort is not touched during the charging.

There are not within our knowledge any practical means for the mechanical drawing of the coke from retorts 3 metres (about 10 feet) long.

III.—Vertical Retorts.

In all countries of the world where gas is manufactured, this system of retorts is now being studied and experimented with. In England, Settle-Padfield and Woodall-Duckham; in America, Dieterich and Isbell; in France, Verdier-Teulon and Lachomette; in Germany, at Dessau and Berlin. Up to the present, however, this system has not got beyond the experimental stage. The vertical retorts built have only been in two or three beds, which have been always managed with the greatest care; and it is still uncertain whether, as they exist to-day, they will respond to the exigencies of working on a large scale without such scrupulously careful management. The time has therefore not yet come, in the present state of the question, to prepare a scheme for an installation of vertical retorts; and we must limit ourselves to a few critical observations on the different systems which we know of, to show the direction which, in our opinion, the carbonization of coal in vertical retorts must take.

Considering in the first place what happens both in horizontal and in inclined retorts, which are never charged and discharged in continuous fashion, we note that each retort is charged all at once and at a moment at which the temperature of the retort is at a maximum. The coal is heated gradually, the production of gas reaches a maximum, together with that of the tar, and then it diminishes up to the end of the time of carbonization. The temperature of the coal or coke also increases with that of the retort; and the gas which is now given off ought, passing between the coke and the incandescent sides, to go up the ascension pipe. During this time there must undoubtedly be a decomposition of hydrocarbons; and the gas engineer is well aware of this inconvenience. Moreover, the following experiment provides further facts concerning the loss of calorific power which occurs when the gas is conducted through completely carbonized incandescent coke:—

	Calories (of Lower Value).
On entering the average calorific power of the gas was	4745
After the gas had passed through the tube—*i.e.*, incandescent coke—at a speed of 80 litres (2·825 cubic feet) per hour, it was	4000
Loss of calorific power (15·7 per cent.)	745

Through meter No. 1 passed . . 240·00 litres (8·475 cub. ft.)
,, ,, 2 ,, . . 260·20 ,, (9·189 ,, ,,)

The increase in volume was . 20·20 ,, or 8·4 per cent.

240·00 litres × 4·745 calories = 1138·80 calories.
260·20 ,, × 4·000 ,, = 1040·80 ,,

Complete loss of calorific power 98·00 calories, or 8·6 per cent. of original power.

We find therefore an increase in volume of 8·4 per cent., a total diminution of calorific power of 8·6 per cent., and a reduction in the calorific power, in proportion to a unit of volume, of 15·7 per cent.

The following analysis also shows the decomposition of a part of the heavy hydrocarbons :—

—	Gas Test taken from Meter No. 1.	Gas Test taken from Meter No. 2.	Difference.
Carbonic acid	3·6	2·0	− 1·6
Heavy hydrocarbons	5·2	1·9	− 3·3
Oxygen	0·7	0·0	− 0 7
Carbonic oxide	14·1	16·3	+ 2·2
Light carburetted hydrogen	23·0	24·0	+ 1·0
Hydrogen	46·1	51·0	+ 4·9
Nitrogen	7 3	4·8	− 2·5

From this it is seen that in the last period of carbonization less carbonic acid is made, fewer hydrocarbons, and more carbonic oxide and hydrogen, which is a result that is confirmed by practical experience.

The decomposition of the heavy hydrocarbons requires, however, a sufficiently high temperature. Leading the gas through a porcelain tube, heated to the temperature of 774° C. (1425·2° Fahr.), there was not any decomposition of hydrocarbons nor increase in volume, and also the calorific power remained exactly the same. Still further raising the temperature in the presence of incandescent carbon (coke), a reducing action was begun, and graphite was produced to the detriment of the quality of the gas. These drawbacks ought to disappear with the introduction of the vertical retort, and, as other advantages of these retorts, may be given: Continuous charging and discharging, unaccompanied by smoke and dust; higher yield of gas and better quality of coke; less labour; greater make of gas on a much reduced area.

We will now consider the two systems of vertical retorts which seem to us to be the best—the German patent of Dr. Bueb, of Dessau (No. I.), and the English Settle-Padfield system (No. II.). Descriptions and results of working these systems are to be found in the Technical Press. Both claim as advantages greater yield of gas per ton of coal, larger make of ammonia, better quality of coke and tar, and reduction of naphthalene and cyanogen. We cannot yet check these statements by practical working; we can only therefore make a technical examination of the two systems. No. I. has straight retorts, which are charged at one instant; so that the method is the same as for both horizontal and inclined retorts. We have already referred to the disadvantages that are inherent in such a method of charging. In No. II. system, there is a combined vertical and inclined retort. The problem of charging is ingeniously solved by a double-cone apparatus. This apparatus has already been tested in practical working. It works absolutely without loss of gas, and requires an insignificant amount of power for its action. Also the discharging in system No. I. is effected at one time, which certainly will give rise to smoke and rapid deterioration of troughs when the coke is carried away mechanically. In No. II. system, discharging is done at short intervals—for example, two hours—and may be called approximately continuous. Carbonization will proceed in a different way in the two systems, consequent upon the different methods of feeding in the coal. In No. I., the whole length of the retort must be heated, and the decomposition of the heavy hydrocarbons is supposed to be overcome, because the gas produced should pass in the middle of the retort through the coal not yet highly heated. If this be really the case, it cannot yet be stated with any certainty. But the length of the retort (4 metres = 13 ft. 1½ in.) raises the doubt that the lower half of the charge will "cake" considerably, making the passage of the gas difficult; so that there will be great differences of pressure in going from bottom to top. To remedy this, there can be greater suction on the hydraulic main, without going too far in this direction, because it would be easy also to draw in furnace gas through cracks in the retorts.

In system No. II., the coal is carbonized almost entirely in the vertical part (which is much shorter) of the retort; and this is highly heated in the following way: The coal enters in small quantities of two or three kilos. (4½ to 6½ lbs.) per minute; and gas is rapidly given off. The richer part of it passes at once into the ascension pipes without coming in contact with the partially heated coal. In this way, the retort is filled bit by bit; but the longer the coal stays in the retort the lower becomes the quality of the gas, which now passes (in No. II. system) without inconvenience through the superimposed coal. It has already been said that the discharging is done every two hours. After a certain time—say, six hours—the coal (or coke) reaches the inclined part of the retort, which is much less heated. The coke therefore leaves much less hot, and is more easily carried away—requiring less water to quench it. The heating of the setting requires less fuel, because there is less loss of heat from it during the discharge. Only the coke that is completely carbonized is taken away, and the amount of it will be always about equal for a given quantity of coal. Within two hours so much fresh coal will be charged (regulating the distance of the cones and the speed), so that the retort will be full again at the moment of the new discharge. This continuous method of feeding carries with it also the advantage that there will be no loss of gas during the charge that the quality of the gas will remain always the same during the whole time of carbonization; and that any stoppages in ascension pipes will be impossible, because the gas always contains water vapour, and passes up the pipes at a lower temperature. This system does not require a hydraulic main, and no (or only a little) suction on the gas-main. The lower lids for the discharge can be opened without air being able to get in, seeing that the charge of the retort itself shuts off the gas-main. For safety sake, the ascension pipe is provided with a valve, which can be easily shut from the discharging stage.

Both the systems give a better yield of gas, attributable to the way in which the gas leaves the retort. The coke will be of better quality because better carbonized, and also much more compact through the action of its own weight. The labour will be about the same for the two systems. No. II. will not require any labour in respect to charging; but the discharging necessitates some amount.

The French system (Verdier-Teulon) and the other English one (Woodall-Duckham) automatically feed the coal. Trials have been made on both to get the discharging also automatic, without any need of labour. We will not go into more detail on these questions. At the stage at which they have arrived to-day, they seem to us still too complicated for practical working.

The Woodall-Duckham system has a hydraulic seal at the bottom of the retort, which not only permits of a continuous discharge by means of a conveyor, but also the recuperation of the heat of the coke (water-gas), which otherwise would be lost during the discharge. The Settle-Padfield system partly achieves the same end by the reduced temperature of the lower part of the retort. The following example shows the not inappreciable saving that can be made in this way.

If, for example, the coke is drawn out at 300° C. (572° Fahr. instead of at 900° C. (1652° Fahr.), two-thirds of this amount of heat will be gained. If the yield of coke in kilogrammes of a bed = A, and the heating absorbs 20 per cent. of the coke produced = $\frac{1}{5}$ A, the heat produced is $\frac{1}{5}$ A × 8000 calories = 1600 A calories. At 300° C. there is lost:

$$\frac{4}{5} \text{ A} \times 300 \times \overbrace{0{\cdot}203}^{\text{Specific heat of coke at 300°}} \text{ calories} = 48{\cdot}72 \text{ A calories};$$

that is,

$$\frac{4872 \text{ A}}{1600 \text{ A}} = \pm 3 \text{ per cent. of the total heat.}$$

Assuming 60 per cent. of the useful effect of the heating, at 900° is lost

$$3 \times 3 \times \frac{100}{60} = 15 \text{ per cent.}$$

The American patent (Isbell), as also the German, sought, at the beginning, to improve the system by applying to the straight vertical retorts side passages to take away the gas as quickly as possible from contact with the sides of the retort and the incandescent coke. This was, however, abandoned owing to difficulty in discharging. All vertical retorts offer the advantage, as compared with horizontal or inclined retorts, of requiring much less material to support them; and thus the useful effect of the heat becomes greater. The surface of the retort in contact with the flame is greater, as the following figures show:—

Horizontal Retort, 3 metres (about 10 feet) long.

Inside length between the walls . . . 2·450 metres (about 8 ft.)
Supported for . . . . . 1·550 ,, (,, 5 ft.)
Surface of the retort not walled in = 63 per cent.

Inclined Retort, 4·5 metres (about 15 feet) long.

Inside length. . . . . 3·600 metres (about 11 ft. 10 in.)
Length of supports . . . . . 1·460 ,, (,, 4 ft. 9 in.)
Length not walled in = 60 per cent.

Vertical Retort (No. II. system).

Vertical part only without curve 1·500 metre (nearly 5 ft.)
Total surface . . . . . 26,376 sq. centimetres (4088 sq. in.)
Supports . . . . . 5,760 ,, ,, (893 sq. in.)
Surface not walled in = 78 per cent.

Which of the two systems will prove the better in practice will be shown by future tests and practical working. From the day when some systems gave useful results, interest became very keen in the principle towards which they were aimed; and perhaps a few years will suffice to solve the problem completely.

[This concludes Part I. of the author's paper, which is the principal and most important portion of his contribution, and which, therefore, we have translated fairly fully.]

Part II. is shorter, and contains brief descriptions of the drawings annexed to the paper. It refers also to the comparative table which we reproduce. As will be seen, it is based on the carbonization of 173,000 kilos. (about 170 English tons) of coal in twenty-four hours, a make of gas sufficient, the author says, for a city of 100,000 inhabitants. For an installation of inclined retorts, the author's design provides for 15 beds, each of nine retorts, 4·50 metres (or 14 ft. 9 in.) long, arranged in three benches of five beds each. Some points of constructional detail

are also given. For the conveying of the coal to the tanks, two bucket elevators, with two breakers attached, are placed at one of the sides of the building. One elevator raises about 25 tons of coal per hour—a quantity sufficient for full working. One elevator remains in reserve. "We wish to remark," says the author, "that the retort-house plant described is better than that of the Mariendorf works near Berlin, so often held up as a worthy example. A careful comparison of our design with that of the Mariendorf plant will persuade any practical technician as to the advantages of our proposals." For horizontal retorts with charging and discharging machines, twelve beds of nines, 6 metres (about 20 feet) long, are arranged in two benches of six beds each. For vertical retorts, there are twenty-four beds, each of six retorts. For horizontal retorts worked by hand, 29 beds of eights, or 232 retorts, are allowed for. The retorts are 3 metres (or nearly 10 feet), long; and between the two houses are placed the coal-stores.

Passing now to Part III. (medium and small works), we observe in general that working by hand cannot any longer be entertained—at least, for works with a make of gas over 2 to 3 million cubic metres (about 70 to 106 million cubic feet). Inclined retorts and horizontal retorts with machinery constitute modern installations; while vertical retorts are plants of the future. The present state of the technics of retort construction has thus reached a stopping point. For larger works, with an annual make of from 8 to 10 million cubic metres (say, from 280 to 350 million cubic feet), selection to-day can only be made between inclined retorts and horizontal retorts with machines, because there has been too little experience with vertical retorts. Which system will be preferred in certain cases, will depend on local conditions.

The cost of purchasing and maintaining charging-machines being, as we have said, very high, their adoption is economically possible only when they can work at full power all the year round. Also the security of working is not great with these machines, which renders it necessary to have a reserve machine both for charging and discharging. We should not propose charging machinery unless the annual make was greater than 8 million cubic metres (over 280 million cubic feet). It is much easier to build inclined retorts, especially where labour is dear, because the advantages of this system increase in proportion to the rate of wages. We should propose inclined retorts (especially if the works were not near houses, and the making of dust was therefore of less importance), where in the summer two beds could remain in service. In our opinion, the number of beds lighted up in the course of the year would be—

2 or 3 beds in April, May, June, July, and August;
3 ,, in September;
4 ,, in February, March, and October;
5 ,, in January, November, and December.

The house ought, therefore, to contain at least five beds, without reserve, for a make of 3 to 4 million cubic metres (say, 106 to 141 million cubic feet). Squads of three men would be required. In the summer these would also have to do the clinkering; while in the winter, a fourth man would be added. There would also be a machine man for the coal-conveying plant, who could supervize the other workmen.

Making a similar calculation for this retort-house as we have for our scheme of fifteen beds, the complete cost per 1000 cubic metres of gas would be 16·24 lire; while for a house of the same producing capacity, with ten beds of 3 metres long horizontal retorts, it would be 16·30 lire. The much simpler working of inclined retorts would lead to their being adopted on account of the less dependence upon the workmen.

For smaller works, from 4,000,000 down to 500,000 cubic metres—say, 141 million to 18 million cubic feet—regenerative settings of eights worked by hand are to be recommended. Costs are given in the table. They have the advantage of being better adapted to variations in the consumption. For works with an annual make of 500,000 cubic metres (about 17,660,000 cubic feet) at the maximum, ordinary fire-bar or semi-generative settings could be adopted, because they cost less both for installing and for maintaining, and require much simpler working. The only disadvantage is the high percentage of fuel for heating.

Vertical retorts are the retorts of the future. Those in our scheme are of too small capacity. It will be endeavoured to modify the system so as to be able to produce 4000 cubic metres (about 141,000 cubic feet) from each bed in twenty-four hours. The simplicity of the feeding apparatus allows of conveniently adapting the make to the variations of consumption, and therefore these retorts should be considered both for large and medium-sized works. However, we are not yet in a position to give practical results for a bed of vertical retorts of this capacity, and we have thus to restrict ourselves to the small bed, as given on the Comparative Table.

COMPARATIVE TABLE OF THE WORKING OF HORIZONTAL, INCLINED, AND VERTICAL RETORTS.

Retort Beds with	I. Inclined Retorts. Coal and Coke Conveying Plant.	II. Horizontal Retorts with Charging and Discharging Machines. Coal and Coke Conveying Plant.	III. Vertical Retorts with Automatic Coal-Feed. Coal and Coke Conveying Plant.	IV. Horizontal Retorts Worked by Hand.
For the carbonization of 173 (metric) tons of coal in 24 hours are required	15 beds of 9 retorts, about 14 ft. 9 in. long.	12 beds of 9 retorts, 19 ft. 8 in. long.	24 beds of 6 retorts, about 13 ft. long.	29 beds of 8 retorts, 9 ft. 10 in. long.
Duration of charge	4 hours 48 minutes.	6 hours	Continuous feeding.	4 hours 48 minutes.
Coal carbonized per retort	5 × 260 kg. = 1·3 (metric) tons.	4 × 420 kg. = 1·68 (metric) tons.	2·5 kg. per 3 min. = 1·2 (metric) tons.	5 × 150 kg. = 0·75 (metric) ton.
Coal carbonized per man employed in the retort-house (including the coal conveying plant) (*a*)	173 ÷ 39 = 4·44 tons.	173 ÷ 30 = 5·78 tons.	173 ÷ 32 = 5·24 tons.	173 ÷ 101 = 1·71 ton.
Coal carbonized per square metre (10·76 sq. ft.) of retort-house surface	173 ÷ 1213 = 0·142 ton.	173 ÷ 1120 = 0·154 ton.	173 ÷ 900 = 0·192 ton.	173 ÷ 2552 = 0·07 ton (including coal stores).
Area of retort-house built upon (including main flue)	370 m² or 3983 sq. ft. = 30·5 %	520 m² or 5597 sq. ft. = 46·4 %	324 m² or 3488 sq. ft. = 36 %	29 × 199 sq. ft. = 5771 sq. ft. = 21 %
Total expense of retort-house working to carbonize 173 (metric) tons (including supervision and coal conveying, &c.)	£6 13s. 0d.	£5 10s. 5·68d.	£5 12s. 5·95d.	£17 3s. 9·69d.
Do., per 1000 tons of coal	£38 8s. 9·94d.	£29 12s. 9·79d.	£32 19s. 4d.	£99 7s. 1·99d.
Do., per 1000 tons over 1 sq. m. (10·76 sq. ft.) of surface	7·584d.	6·446d.	8·722d.	19·339d.
Total cost (*b*)	39 men at £6 13s. 0d.	30 men at £5 10s. 5·68d.	33 men at £5 12s. 5·95d.	101 men at £17 3s. 9·69d.
Surface, buildings, foundations, chimneys	about £5024	about £4800	..	about £4160
Retort-beds including buckstays, &c.	15 × £912 = £13,680	about £11,520	..	29 × £360 = £10,440.
Nine shoots for the service of the retorts	£216	..	..	..
Four machines for charging and discharging	..	£2240	..	..
Two elevators	£480	£480	..	..
Two breakers	£768	£768	..	..
Coal-conveying chains	£120	£120	..	..
Electric motors	4 at £600	6 at £816	..	..
Coke conveyors	230 ft long. £1248	2 × 115 ft. long. £1248	..	Scoops, &c., £320.
Gas, tar, and water pipes, valves, brackets, and platforms	£1136	£1008	..	£1200
Coal tanks	16,245 c. ft. capacity. £784	18,365 c. ft. capacity. £912	..	..
Miscellaneous	£184	£176	..	£160
Total	about £24,240	about £24,088	..	about £16,280

(*a*) For the purposes of the comparative table, there are assumed to be four retort-houses of the same capacity (173 tons per 24 hours) and a working day of 8 hours per squad. The results given in columns I., II., and IV. are taken from actual working; the results given in column III. of the Settle-Padfield vertical retorts are estimated as accurately as possible according to local conditions.

(*b*) The following workmen are included in the total cost of working: Foremen, stokers, assistants for clinkering, also for cleaning ascension-pipes, machine men, workmen for coal conveying plant.

TRANSLATOR'S NOTE.—The monetary equivalents of Italian lire have been given at the rate of 25·18 lire = £1 for the detailed figures of working, and at 25 lire = £1 for the round figures of the costs of the plants. A metric ton or 1000 kilos = 19·684 cwt. or 0·9842 of an English ton.

KRAMERS AND AARTS WATER-GAS PLANT AND ITS USE IN GAS-WORKS.

In our issue of July 17, we gave (p. 166), a report on the Kramers and Aarts water-gas plant at the Zevenbergen Gas-Works. We to-day publish the first part a full translation of the paper describing this system of water-gas production, which was read by Dr. A. Steger, the Manager of the Amsterdam Company for its exploitation, before this year's meeting of the Société Technique du Gaz en France.

Before giving an account of the actual manufacture of water-gas on the Kramers and Aarts system, and before speaking of its use in gas-works, I do not think I can dispense with a few words on the reactions which occur during its manufacture. However, I will not be long over this theoretical part, but will give most space to facts.

Theoretical Part.

You all of you know that steam brought in contact with incandescent carbon is decomposed into its elements, hydrogen and oxygen; the former remaining intact, while the latter combines with the carbon. The nature of these two elements, oxygen and carbon, necessitates two different chemical compositions between them—one in which the molecule is formed of one atom of carbon and one of oxygen, and another in which it is formed of one atom of carbon and two of oxygen. The first body is carbonic oxide, and the second carbonic acid. It follows then, from the numerical atomic composition of these two products of the oxidation of the carbon, that carbonic oxide is intermediate between the carbon and carbonic acid, and is the result of a sort of imperfect combustion. Logic demands that one passes from carbon to carbonic acid by way of carbonic oxide. But here the facts are against the logic of the ideas, and we are convinced, for several reasons which I need not state, that the combustion of the carbon operates at once, and directly, as far as carbonic acid. It is only in the second place that carbonic oxide is formed, resulting, therefore, not from the combining of one atom of carbon with one atom of oxygen (C + O), but from one atom of carbon superadding itself, so to speak, to the carbonic acid formed directly ($CO_2 + C = 2CO$). That is to say, that carbonic oxide is not the result of incomplete combustion of carbon, but rather a new reaction between carbon and the result of the combustion into carbonic acid—a reaction that has been called a "reduction." It therefore seems to me to be more logical, when speaking of the "combustion" of carbon, to countenance no other product from the reaction except carbonic acid, and only speak of carbonic oxide as being a "reduction" of carbonic acid. I do not forget that in practical working it is often easier to see in carbonic oxide only the product of the incomplete combustion of carbon; but as, from what I propose to show, this faulty point of view may give rise to mistakes, I am obliged to avoid it.

I spoke, at the beginning, of the reaction between steam, or, better, between the oxygen that it contains, and carbon; but there is a mixture into which oxygen enters more easily still into reaction with carbon, because it is found in it, not in a state of combination as in steam, but in a free state—I mean the air. But once the ties between hydrogen and oxygen in the steam have been broken, there is no difference between the reactions of the carbon with the mixture obtained than with the mixture called air. In the latter case, the product of combustion is also carbonic acid, likewise reducing itself into carbonic oxide by new carbon; the nitrogen, in place of the hydrogen, as in the previous instance, remaining intact. We have then the three following reactions:

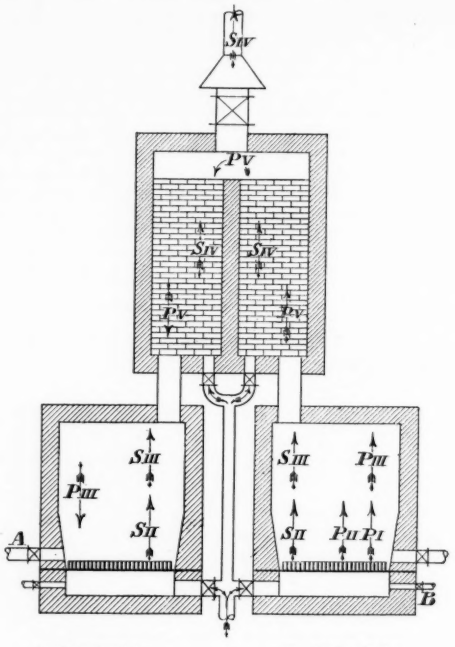
I. Steam = hydrogen + oxygen.
II. Oxygen + carbon = carbonic acid.
III. Carbonic acid + carbon = carbonic oxide.

Of these three reactions, the first and the third are endothermic—that is, absorb heat—while the second is exothermic—that is, gives off heat. None of the three is instantaneous, but the higher the temperature, the less time they require to be effected. These are the necessary elements for the theoretical treatment of what passes in the generator of a water-gas plant. Let us now see what occurs as a matter of fact.

After the fire has been lighted, and when the bed of incandescent coal has reached a sufficient temperature, steam is introduced below the fire-bars. The first reaction that will take place will be the decomposition of the steam into its constituent elements; and this reaction will be the more complete the higher the temperature is, or the longer the contact is with the red-hot carbon.

As soon as one part of the steam is decomposed, carbonic acid will be formed, according to reaction No. II. The combustion of carbon will take place immediately; and unless there is a large excess of oxygen, which is impossible at this point, it will be complete. Carbonic acid entering into play, reaction No. III. begins, if, at least, the conditions are favourable, because the reduction of carbonic acid only commences to any extent at a certain temperature—about 600° C. (1112° Fahr.). But as the temperature in the generator must be already very high for the steam to be decomposed as perfectly as possible, this reaction (No. III.) will undoubtedly begin; and as just before for the decomposition of the steam, so it will be so much the more perfect the higher the temperature of the fire, and the longer the contact with the carbon. There results, therefore, from these three reactions, a mixture of undecomposed steam, carbonic acid, hydrogen, and carbonic oxide. The greater the temperature and the longer the contact, so the amount of the first two will be less, and that of the last two more. Now, as the object to be achieved is to obtain hydrogen and carbonic oxide to the exclusion of every other body, the process aims at these conditions always being fulfilled.

The heat necessitated by the decomposition of the steam (Reaction No. I.) being greater than that set free by the combustion of the carbon (No. II.), and this latter being still further diminished by the endothermity of the reduction of the carbonic acid (No. III.), there follows a lowering of the temperature, and so an increase in the quantity of steam and carbonic acid. The quality of the water-gas would soon become so bad that the "run" (or period of production) would have to be stopped, and the fire re-blown. During this blow, the air reacts on the carbon in the same way as in the reaction No. II., and the carbonic acid which results from it is opposed, from the time of its formation, to the reducing effect of the carbon which it meets in passing through the incandescent bed. This last reaction (No. III.), so profitable during the "run," one tries to restrict as much as possible during the "blow;" and for the simple reason that it takes away from the fire a great deal of the heat which the combustion of the carbon (No. II.) has stored up in it. But then, in all systems of pure water-gas, which work with a single generator, this carbonic oxide is thrown off as a sheer loss into the air, which reduces by so much the output of the apparatus. The reduction of the carbonic acid, however, depends also on the temperature and the duration of the contact with the fire. The higher the former and the longer the latter, the more the carbonic acid will be reduced. Care must therefore be taken that the temperature is kept as low as possible, and that the length of time of the passing of the air is as short as possible—that is to say, speaking practically, that the incandescent bed should be small and the speed of the air rapid. In short, water-gas requires a high temperature, a deep bed of carbon, and a long duration of flow during the "run;" while during the "blow" it wants a low temperature, a thin layer of carbon, and a short passage.

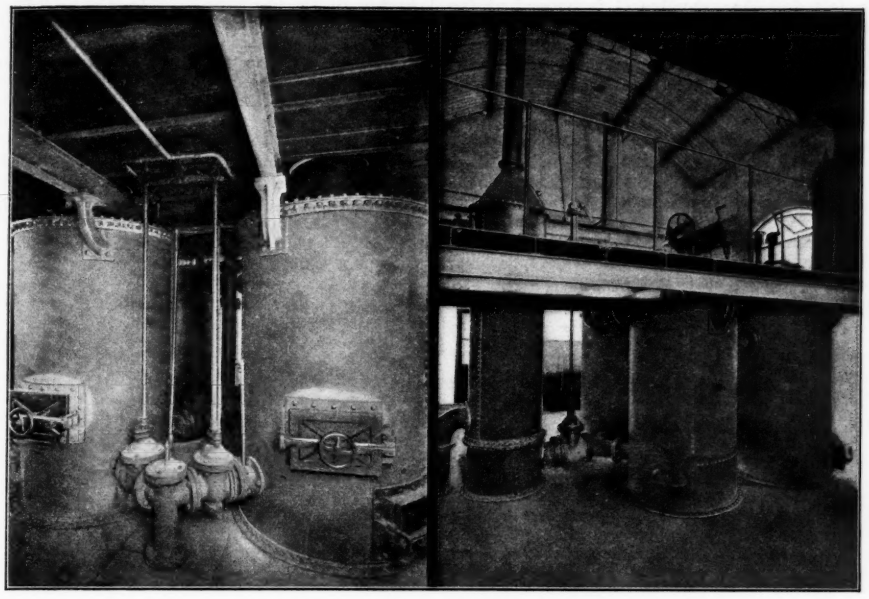


A. Gas Outlet. B. Steam Inlet.
S. Direction of Flow during the "Blow."
P. Direction of Flow during the Production of Gas.

Fig. 1.

I. Steam = hydrogen + oxygen.
II. Oxygen + carbon = carbonic acid.
III. Carbonic acid + carbon = carbonic oxide.
IV. Carbonic oxide + oxygen = carbonic acid.
V. Steam + carbonic oxide = carbonic acid + hydrogen.

You see that the process for the manufacture of water-gas seems to entail two contradictory claims. M. Kramers has reconciled them in a simple and practical way by cutting the generator into two, and by forcing the air through these two generators simultaneously, and the steam through them successively. The moderate temperature that he gives to the two generators, which is advantageous during the "blow," does not do any harm during



The Generators. The Regenerators and Superheater.

Fig. 2.—The Kramers and Aarts Water-Gas Plant at the Zevenbergen Gas-Works.

the "run," because the steam has to pass the two generators one after the other. Thus the evil caused by the lowering of the temperature is corrected by the longer time of contact. Notwithstanding the moderate temperature of the generators, the shallowness of the bed of fuel, and consequently the short duration of the contact during the "blow," carbonic oxide is always formed in small proportion. Also, for each generator M. Kramers has allotted a regenerator in which the carbonic oxide is burnt (IV. Carbonic oxide + oxygen = carbonic acid). The heat given off by this combustion is accumulated in the fire-bricks filling the generators, so that the waste gases pass to the chimney with as low a temperature as possible.

Let us now see what is produced during the "run" in the different parts of the apparatus which is the outcome of this system. The steam is not entirely decomposed in the generator into which it is sent. This is a logical consequence, as we have seen, of the conditions necessary for this reaction, of the moderate temperature, and of the short duration of contact due to the small height of the incandescent bed. For the same reasons, a part of the carbonic acid, formed in the first place according to the reaction No. II., escapes from the reduction. There results, therefore, from passing through this generator, a mixture containing carbonic oxide and hydrogen, and, in appreciable proportions, steam and carbonic acid. This mixture passes through the two regenerators one after the other. Here it is that these components are submitted to a high temperature—about 900° C. (1652° Fahr.), and to a close contact by reason of the zig-zag way they have to go. Under these conditions another reaction takes place. This is the oxidation of the carbonic oxide by the steam, from which result carbonic acid and hydrogen (V. Steam + carbonic oxide = carbonic acid + hydrogen). The fact that this reaction can be produced in the regenerators is one of the great advantages of the system, because the steam, arriving in a non-decomposed state from the first generator, must be first of all split up in the second generator (No. I.); then the oxygen will have to combine with the carbon, in order that finally the carbonic acid resulting from it (No. II.) may be reduced according to the third reaction. It is not necessary to have made a special study of the speeds of reactions or of chemical equations to see that, everything being equal, the final product of carbonic oxide and of hydrogen will be more quickly obtained if a start is made from carbonic acid and hydrogen instead of from steam itself.

At the inlet to the second generator, the mixture will therefore contain—besides hydrogen and carbonic oxide—a considerable amount of carbonic acid. It is in the second generator that this last will be reduced into carbonic oxide; and it is for this reason that this generator has been called the "reducer." The mixture leaving the reducer contains the smallest possible quantity of carbonic acid and of steam; and this is obtained without the generators being raised to such a temperature that the losses during the "blow" carry off the gains obtained during the "run." To prevent all confusion between the two fires, the steam is forced alternatively, for two successive "runs," into both the generators; so that each fire works at one time as an actual generator, and at another time as a reducer. It is obvious that this prevents any irregularity in the working of the apparatus. The hottest parts of the fires, those where the primary air enters, are in this way passed through during the first and last "run." This is further of advantage in decomposing the steam and in reducing to carbonic oxide; while changing the direction of the gases in the two successive "runs" also maintains uniformity as regards this feature of the system. Moreover, the advantage of changing from time to time the direction in which the steam passes through the incandescent bed is already recognized in different systems of water-gas, and most of them adopt the practice.

If I have spoken up to the present of reactions between the air or steam and "carbon," it has only been for simplicity's sake. In practice, as you know, pure carbon is not used, but combustible materials which contain it in a more or less high proportion —such as coke, anthracite, rich or poor coal, wood, &c. The principal difference, from the point of view which we are considering, between these various fuels is that some do not contain volatile matter, while such is not the case with others. For the manufacture of water-gas, generally the former are used—either coke, because it provides a good outlet for the chief bye-product from gas-works, or anthracite, or non-bituminous coal. But with the system that I have just described to you, rich coal, or any other fuel giving off volatile matter, can also be employed with complete success. In such a case, the regenerators work in addition as fixing chambers—that is to say, the products of the distillation react on the undecomposed steam leaving the generator, and are burned by it into carbonic acid and steam. These, in passing through the reducer or second generator, are changed into water-gas. I note, with a certain amount of satisfaction, this remarkable adaptability of the system, not because I think that these fuels will be much used in the future for making water-gas, but because M. Kramers' first experiments with the system in 1901 were very successfully made with ordinary gas coal. Also I think that it is a good thing to know that the manufacture of water-gas is not limited to the use of coke, nor even to anthracite or non-bituminous coal, but that with M. Kramers' system any kind of fuel can be used without having to consider the tar, which will be burnt and destroyed in the regenerators and the generator-reducer of the plant.

Practical Part.

To leave now theoretical considerations, I give two photographs of water-gas plant constructed on the system which I have explained. (See fig. 2.) On the left will be seen the front of the two generators, each provided with ashpit and clinkering doors. Two outlet pipes, one to each generator, join in a single pipe by which the hot gas is taken to the washer-scrubber, where it is reduced to the temperature of the water, and cleaned from dust, and from any trace of ammonia that it might contain. This washer-scrubber is alone sufficient for the physical purification which pure water-gas needs. So there is neither hydraulic main, nor frictional or other condensers, nor rotary washer. The gas passes through an intermediate gasholder, which is used to equalize the intermittent output of the gas. It is collected in the gasholder, after having been relieved in the purifiers of the small amount of sulphuretted hydrogen it contains (4 grammes per cubic metre). As this quantity is not even half that contained in coal gas, it follows that for pure water-gas the purifiers need not be so large as for coal gas, which means an economy in the first cost. Below the working platform is the arrangement adopted so as to avoid the stoker being able simultaneously to open both the gas and air valves. This arrangement consists of two jointed hooks, *m* and *n*, worked by the same rod *e* and *h*, controlled in turn by the opening and closing movement of the superheater-valve R (fig. 3). So when the rod is turned to the right, the

two hooks go to the left, and the gas-valve G is opened at the same time that the air-valve A is shut, and *vice versâ*.

Returning to fig. 2, the right-hand view is of the side of the apparatus, and shows the two regenerators, which are placed on the ground. After the two regenerators comes the superheater, serving also as a chimney. The cold air blast, which enters at the top, is heated by its passage round the pipes through which the products of combustion escape into the air. This superheater does not form an integral part of the system, and can be done away with, either in cases where the waste heat is able to be utilized in another way, or for other reasons.

Fig. 4 shows an arrangement of the plant which calls to mind the diagram (fig. 1) which I used for my theoretical exposition. There is no superheater, and the regenerators are placed above the ground. For technical reasons, the two regenerators have been combined into one double regenerator capped by the

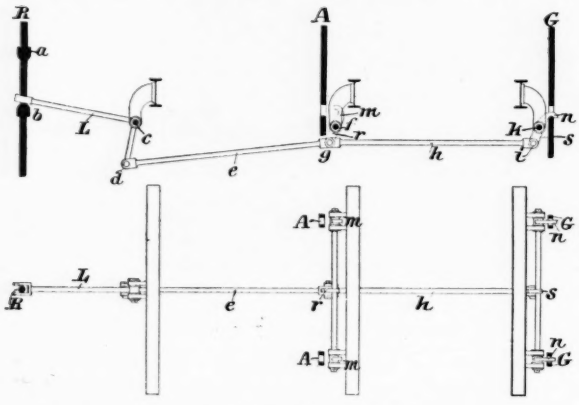


Fig. 3.—Safety Appliances.

chimney. The working platform above the apparatus allows of controlling the four air-valves, the two gas-valves, the steam-cocks, and the superheater-valve. The arrangement of these different valves and their duty is more easily seen from the working platform of the Amsterdam installation (fig. 5). On the right will be seen the mechanism for working the four air-valves. It is composed of two shafts provided at their ends with two small pinions, which work the rack valves The two shafts—one of which controls the primary-air valves, the other the secondary-air valves—are made jointly and severally answerable by three gearing wheels. Two of these wheels are keyed on to the shafts, and the third is on an intermediate shaft. The pitch and diameters of this gearing are calculated so that the primary and secondary (half the size) air-valves can be shut or opened simultaneously by means of only one handle. This mechanism works perfectly in every-day use. On the left of the illustration is shown, first of all, the charging-hoppers, and then the gearing for working the gas and steam valves. The valve of the superheater is on the right, but cannot be seen in the illustration.

Suppose a "blow" is taking place. The superheater-valve and the four air-valves are open. After three-quarters of a minute (the duration of the "blow") the workman shuts the air-valves, and lets a small quantity of steam go into the two generators so as to clear out into the atmosphere the nitrogen found in the regenerators. Then he shuts the superheater-valve and opens first of all the gas-valve, and then the cock which allows the

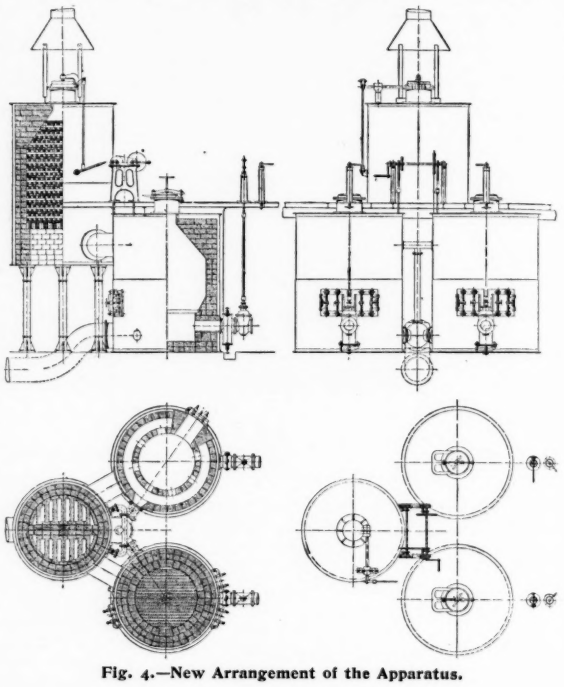


Fig. 4.—New Arrangement of the Apparatus.

steam into the generator, opposite to the point where the gas goes out. The controlling rods of this gas-valve and of the steam-cock, although belonging to different generators, are within reach of the workman's hand, so as to facilitate his work. It is the same with the gas-valve and steam-cock which have to be open in the period following the "run." After five minutes, the "run" is finished, the gas-valve and steam-cock are closed, the superheater-valve and air-valves are opened, and a new "blow" begins.

(To be continued.)

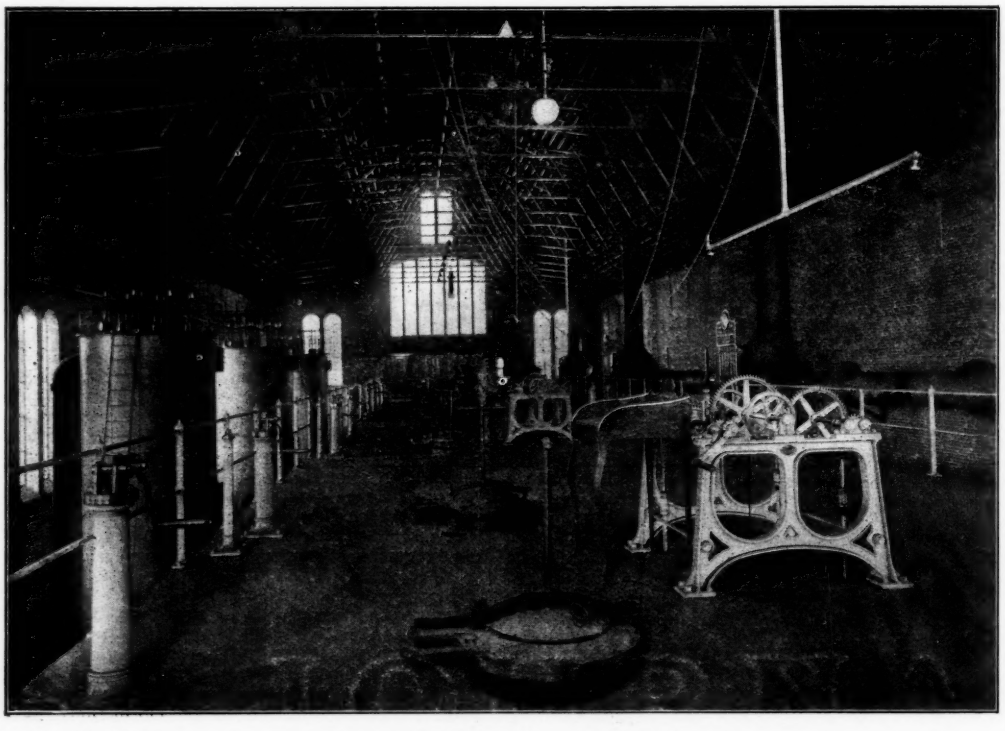


Fig. 5.—The Working Platform of the Water-Gas Plant at Amsterdam.

EFFECT OF HYDROGEN IN OXYGEN USED FOR CALORIMETRY.

In a recent issue of the "Journal für Gasbeleuchtung" there was an article by Herr Ed. Graefe, of Webau, upon the effect produced in calorimetry by the presence of hydrogen in the oxygen employed to consume the fuel under examination.

The compressed oxygen offered for sale at the present time is made in one of three ways—viz., by the chemical process of passing air over heated barium oxide or an orthoplumbate, by the fractional distillation of liquid air, and by the electrolysis of alkaline water. Only the latter kind of oxygen is liable to contain hydrogen; but, owing to the great difference in speed with which the two gases diffuse, electrolytic oxygen is prone to be contaminated with hydrogen, and, if the apparatus is not properly attended to, the proportion may reach 6·5 per cent., and the mixture becomes explosive. The explosion of a vessel of compressed electrolytic oxygen, owing to the presence of hydrogen in it, has already been recorded. As a rule the amount of hydrogen in compressed oxygen does not exceed 2 or 4 per cent.

Some years ago, it was shown qualitatively by Thomas and Van Leent that if there is hydrogen in the oxygen with which a calorimetric bomb is charged, the results obtained on burning a fuel are higher than they should be. Graefe has now investigated the subject quantitatively, igniting two samples of paraffin oil in the Hempel bomb with oxygen containing known quantities of hydrogen. In each experiment, a weighed amount of oil was dropped upon a mass of cotton wool previously introduced into the bomb, oxygen was driven in till the pressure reached 5 atmospheres, and then allowed to escape in order to drive out most of the nitrogen. The desired volume of hydrogen was next added from a mercury pipette; and finally the bomb was charged with oxygen to a pressure of 12 atmospheres. After deducting the calorific value of the cotton wool, Graefe's results were:

Hydrogen in the Oxygen. Per Cent.	Sample I. Calories.	Sample II. Calories.
—	10,020	9,882
1	10,127	10,104
2	10,329	10,245
3	10,543	10,453
4	—	10,597

It will be seen that the apparent calorific value of the oil rises steadily as the oxygen used to burn it contains a larger proportion of hydrogen; the rate of increase being on an average 180 calories per 1 per cent., or 1·8 per cent. of the true calorific value of the oil. The individual figures representing the increases in calorific value differ from the mean by less than 1 per cent., which, according to Möller, is the limit of accuracy of the Hempel apparatus. Thus if an oxygen containing 4 per cent. of hydrogen were employed in the bomb, the calorific value of the oil would be returned as more than 7 per cent. higher than it should be—an error too large to be ignored in practice.

The weight of oil oxidized in each of the foregoing tests was almost the same, and therefore it could not be ascertained whether the whole of the hydrogen present was burnt, or whether an amount was oxidized proportionate to the volume of oxygen consumed. To settle this point, three other tests were made of the same oil; the bomb being charged in succession with approximately 0·2, 0·4, and 0·6 gramme of paraffin—the oxygen containing 2·5 per cent. of hydrogen in each case. The differences from the true calorific value so obtained ranged only from 385 to 422 (mean 407) calories—*i.e.*, were sensibly unaffected by the quantity of fuel employed; the amount of hydrogen oxidized being proportional to that of the oxygen consumed.

Hence it follows that an oxygen contaminated with hydrogen may be used for calorimetric purposes, provided, of course, that the proportion of hydrogen is not sufficient to render the gas dangerous on the grounds of explosibility. By analyzing the gas in each cylinder, the proportion of hydrogen can be found, and a correction can be made for the error introduced by it. In the case of oil, each 1 per cent. of hydrogen increases the true calorific value by 1·8 per cent.; so that the experimental result has only to be multiplied by

$$\frac{100}{100 + x \times 1{\cdot}8}$$

(where x is the percentage of hydrogen) to obtain the correct figure.

MANUFACTURING INCANDESCENT MANTLES WITH COPPER CELLULOSE.

Last week (p. 695) brief allusion was made to a communication to the "Zeitschrift für angewandte Chemie," by Herr W. Bruno, in reference to a new process for the manufacture of incandescent gas-mantles, by impregnating the fabric of which they are made with copper cellulose. Further particulars of the proposal are now to hand in the course of an article that appeared recently in the "Zeitschrift für Beleuchtungswesen," and has been translated by the "Illuminating Engineer," of New York.

Herr Bruno writes: Incandescent mantles are made of cerium earths, together with thorium and zerconium oxides; cotton thread and Ramie fibre (Chinese grass) being used as the oxide support. The thread is knitted into a hose, which is soaked in solutions of the cerium compounds, and, when dry, cut in pieces about 20 cm. long. The cotton is then burnt out; and, in a white heat, the cerium salts turn into oxides. A little manipulation over the blowpipe will harden and form it and thus complete the manufacturing process.

Trials with many other natural oxide supports—like silk, hemp, &c.—have been made, but with no success. Artificial threads were then employed; but as they do not readily absorb the solution, it is necessary to add the solutions of the cerium metals to the viscous substance from which the thread is then pressed. Thus it is impregnated and spun at the same time. This process was not bad, although rather complicated and expensive to carry out.

So far, only thorium nitrate has been used to obtain the oxide, because it has the highest surface-tension. If a piece of thorium nitrate as large as a pea is placed in a platinum dish of about 20 ccm. capacity, the nitrate, on changing to the oxide in the heat, swells into a foam much beyond the capacity of the dish. This is the test of its quality; for it is believed not to shrink afterwards. However, shrinking cannot be prevented altogether.

A new artificial thread has recently been made that may easily be impregnated—viz., copper cellulose. It does not, however, combine with thorium nitrate. A copper cellulose mantle absorbs the thorium nitrate solution well enough; but on burning it the oxide is not formed, and it falls to pieces. The remedy is to substitute the hydroxide for the nitrate. This thorium hydroxide is a bye-product in the manufacture of thorium. It is precipitated when the acid solution is shaken with ammonia.

Unlike the nitrate, the hydroxide does not swell at a white heat, but shrinks together; is gelatinous; and, instead of a loose powder, it forms sharp, diamond-like crystals. It is not possible to impregnate a thread with it; but it is necessary first to soak the copper-cellulose thread in the nitrate solution (just as with cotton or Ramie thread), and then convert it into hydroxide by means of an ammonia bath.

I have often thought when I saw the oxide manufactured from the hydroxide, why, in spite of the above-mentioned physical properties, it should be wholly impossible to use this chemically pure oxide in the making of mantles. Plaisetty, the Spaniard, has shown us, though, that it may be used with copper cellulose to make a mantle that has surprising advantages over those till now made with thorium and zirconium.

The discovery must have been rather accidental; for who would think of using thorium hydroxide to impregnate a copper-cellulose thread, when it cannot be done with the nitrate solution, or when it has no effect on cotton or Ramie thread?

The old mantle is very hygroscopic; and this absorption of moisture causes much trouble, especially to the big dealers, since they get them in hose form, after having been impregnated with the salts, and do the finishing themselves. These new mantles, on the contrary, do not have this bad quality. If they are put in water for hours, there will not be the least oxalic acid found. This means an immense improvement.

There is a good apparatus in the market for testing the strength of mantles by percussions. An old one of good quality can stand from 90 to 100 shocks, whereas the new copper-cellulose mantle can stand from 2000 to 3000 shocks and still be good.

A microscopic photograph of a nitrate-oxide thread shows a mass of loosely-twisted fibres; that of the copper-cellulose thread, a few untwisted wires.

As to the patent rights, it may be seen that it is easily possible to circumvent them; for, instead of the specific method stated therein, to "treat the dry impregnated material with an alkaline bath," the thorium solution might—in order to obtain the hydroxide—be treated with hydrogen peroxide at 60° C., in an acid solution. This process would not in the least interfere with the patent rights; in fact it gives still better results. The formula of the oxide obtained by this method, I am quite sure, is not, as commonly supposed, ThO_2, but Th_2O_7, and remains unchanged at the temperature of incandescence. The cerium also occurs in a corresponding form when hydrogen peroxide is used instead of ammonia, which, by the way, is a compound that is as yet little known.

Artificial Manures in Japan.—In his report for 1906, the Acting British Consul at Nagasaki (Mr. H. G. Parlett) draws attention to an exhibition of the productions of the Island of Kiushiu held in the town of Saga. Referring to artificial manures, it is remarked that a small building was devoted entirely to the artificial fertilizers of one of the largest firms of the sort in Japan. They turn out principally sodium sulphate and phosphates. The present output of the Company is two-and-a-half million bales yearly; and a new branch now being established will add another half million. Many other new factories are springing up. The demand for fertilizers is a remarkable feature of Japanese agriculture during recent years. The import still grows apace; while, at the same time, the home production makes rapid strides. Even so, the call for these manures is so brisk that the combined home and foreign supply is said to be inadequate; and prices are rising in consequence. The import is composed mainly of sulphate of ammonia, oil-cake, and phosphates.

REGISTER OF PATENTS.

Blending Producer Gas with Coal Gas.

SHADBOLT, R. G., of Grantham.

No. 16,955; Aug. 22, 1905.

The object of this invention is "to blend producer gas generated primarily for the purpose of heating gas-retorts with the coal gas obtained from the retorts in the ordinary mode of gas manufacture—thus increasing the total volume of gas made; the two kinds of gases being so blended as to form a consistent bulk or whole, whereby also the light hydrocarbons, liquid and vapourous, contained in the crude coal gas (which hydrocarbons would otherwise be precipitated with the products of condensation) are gasified and retained in their vapourous form."

The gas produced by continuously supplying incandescent fuel with air may be introduced into the hydraulic main, foul main, or other part of the plant, where the pull of the exhauster can be utilized to draw it from the furnace into the main stream of gas, as indicated in the illustration.

Fig. 1 is a front elevation of a known arrangement of gas-making apparatus comprising two benches of retorts with attached parts for the present invention applied thereto. Fig. 2 is a cross section showing a portion of the gas producer or furnace with the outlet for producer gas. Fig. 3 is a cross section of the hydraulic main, foul main, and attached parts, and the upper portion of the pipe for conveying producer gas to the foul main. Fig. 4 is a sectional plan of fig. 3.

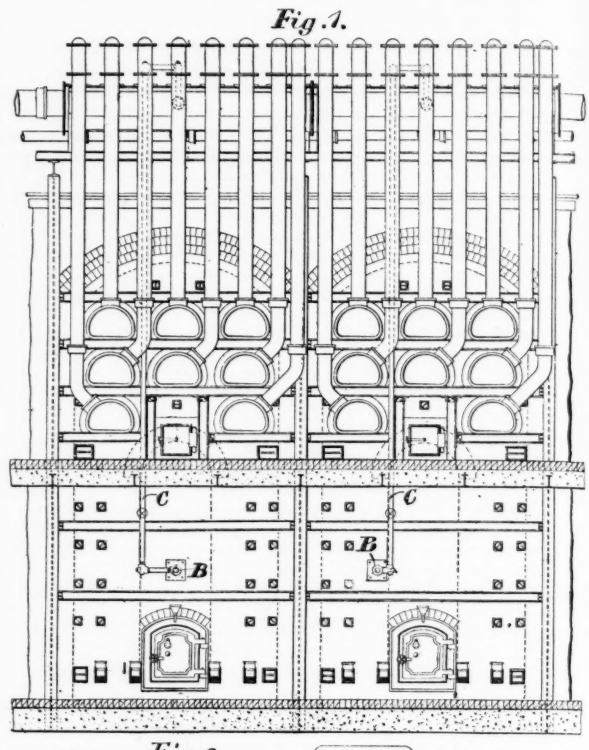
The apparatus shown comprises two benches of gas-making retorts above a gas-producer. The front wall of each producer has an outlet A above the top of the fuel, through which some of the producer gas can be drawn off for blending with the coal gas produced in the retorts. Each such outlet is formed in a block of fire-clay—secured in the front wall of the producer and provided with a metal cap or head B, formed as an extension of the block. The head and lining are formed with co-axially arranged clearing-out passages, normally closed by a plug; also with branch passages, to which an upright outlet-pipe C is connected. The pipe extends upward and over the hydraulic main (into which the ascension pipes dip in the ordinary way), and is attached to the outlet-pipe D connecting the hydraulic main to the foul-gas main E. The arrangement is such that, when the apparatus is at work, producer gas at a high temperature will, by the action of the exhauster connected to the foul main, be withdrawn from each gas-producer through the corresponding outlet A and pipe C, and be delivered into the pipe D, where it will become mixed with the coal gas passing through such pipe from the ascension pipes and hydraulic main.

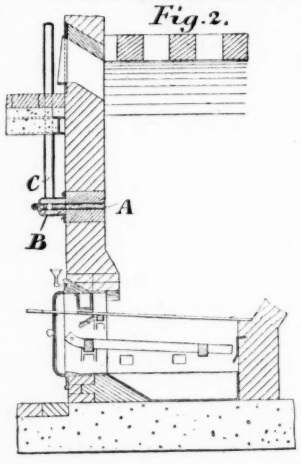
In order to maintain the temperature of the withdrawn producer gas at as high a degree as possible while passing through the gas-pipes C, each of these pipes may advantageously be coated with material that is a bad conductor of heat—asbestos, or fire-clay—held in place around the pipe by a light metal casing. By this means "the blend of coal and producer gases will be obtained at a higher temperature than would otherwise be the case, and liquid and vapourous hydrocarbons that might otherwise be deposited in the foul main are gasified and retained in the blended gases."

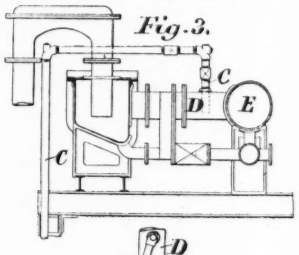
The amount of producer gas to be blended with the coal gas in the manner described may be varied; but good results are said to be obtained by mixing the two gases in about the proportion of one volume of producer gas to five volumes of coal gas. For a bench of eight retorts, as shown, a gas delivery pipe of about 1½ to 2 inches in internal diameter may advantageously be used for passing the required quantity of producer gas—the pipe being made as short as possible.

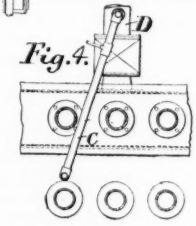
With a view of maintaining the proportions of the two gases approximately constant, notwithstanding variation in the amount of retort gas being produced at different times, to suit varying requirement, but with the difference already mentioned—namely, that the maximum proportion of producer gas shall be introduced during the time of maximum make of retort gas, and the minimum proportion during the time of minimum make of retort gas—the water-loading arrangement shown in fig. 5 may be used in connection with the steam or compensating governor of the exhauster. In this arrangement, there are provided, in connection with the small gasholder commonly employed for controlling the action of the exhauster, and comprising water-tank, gas-bell (the interior of which is in communication with the hydraulic main by a pipe terminating above the level of the water in the tank), and mechanism comprising a rack, toothed segment, and rod for transmitting the vertical motion of the bell to the steam-valve F of the engine used for driving the gas-exhauster. The vessel G (open at the top) is placed upon the gas-bell, and connected to a portable vessel H by a flexible tube with a cock for regulating the flow of water. The arrangement is such that when it is desired to decrease the action of the exhauster, as when the make of gas begins to decrease, the vessel H is placed upon a support above the vessel G, so that the water will gradually run into it at a rate regulated by the cock, and thereby gradually depress the gas-bell to a given extent and cause it, through toothed gearing, to gradually adjust the position of the steam-valve F, to reduce the supply of steam to the engine driving the exhauster; and when it is desired to increase the exhausting action of the exhauster, as when the make of gas begins to increase, the vessel H is placed below the vessel G, so that the water will gradually flow from the latter vessel into the former one, and allow the bell to gradually rise and so adjust the position of the steam-valve to increase the supply of steam to the engine.

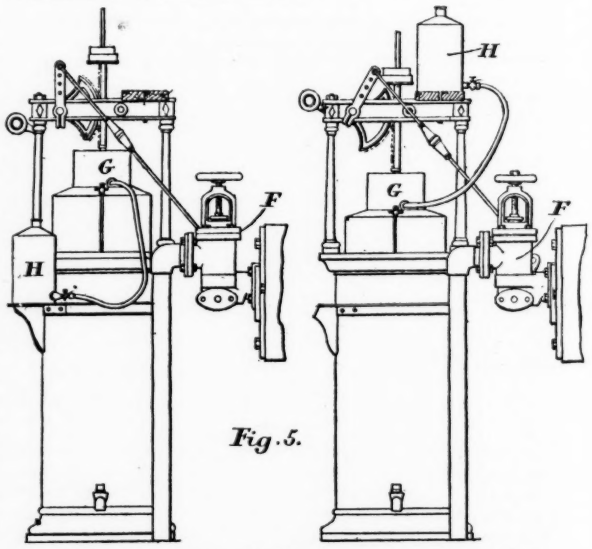
The patentee concludes his specification in these words: I am aware that it has heretofore been proposed to burn some of the gas produced in a water-gas producer, both when blowing up with air and during injection of steam, to heat coal in retorts to produce coal gas; the coal gas produced during the blowing-up stage being mixed with the producer gas and burnt partly for heating the retorts and partly for heating the carburetting and superheating chambers, and the coal gas produced during the injection of steam being mixed with the water gas—some of the resulting mixture being burnt for heating the retorts, and the remainder being passed into the carburetting chamber, and carburetted by the addition of oil gas, and the resulting mixture passed through the superheating chamber. I am also aware that it has been proposed to place retorts inside a water-gas producer, and to make











Shadbolt's Apparatus for Blending Producer Gas and Coal Gas.

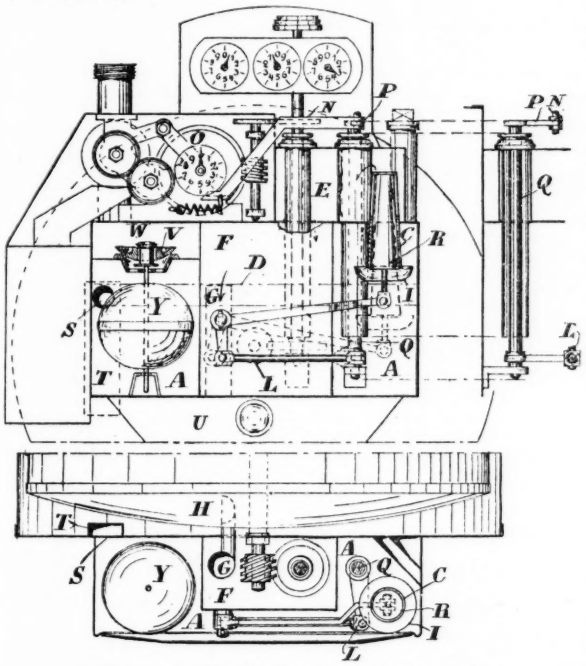
coal gas in them during the blowing-up stage, to mix the coal gas with the water gas produced during the subsequent injection of steam into the incandescent fuel, and to simultaneously produce oil gas, which is added to the mixture of coal gas and water gas; also, that it has been proposed to make coal gas by heating coal in retorts heated by the combustion alternately of producer gas and water gas made alternately in a water-gas producer, and during the production of the water gas to mix some of such gas with the coal gas. I make no claim to any of such modes of making gas which are outside the scope of my invention.

Coin-Freed Wet Gas-Meters.

DURNBERG and Co., and OLTHOFF, H., of Berlin.

No. 438; Jan. 6, 1906.

This invention relates to means for securely closing the gas-passage in coin-freed wet gas-meters when the prepaid amount of gas has been used. It has previously been proposed to provide a vessel (containing liquid), which, when raised by the action of a float, causes the lower end of a gas-pipe to become immersed in the liquid in order to stop the supply of gas. In accordance with this invention, the closing is effected owing to the fact that, after the termination of the supply, a dipping vessel, plunger, or bucket, which during the time the gas passage is open is immersed in the liquid, is lifted by the operation of the registering mechanism against a pipe arranged inside the meter, and through which the gas passes until the lower end of the pipe is immersed in the vessel. A body connected with the plunger bucket also gives warning when the amount of gas is almost consumed, and likewise renders the cutting off of the gas certain by means of a small quantity of liquid.



Durnberg and Olthoff's Coin-Freed Wet Gas-Meter.

The pipe C is arranged in the meter casing above the highest level D of the liquid in such a manner that the gas is only able to pass from the chamber A, which is connected with the gas-supply pipe, through the pipe C into the chamber E, and thence into the measuring drum H, after flowing through the chamber F and the passage G. Beneath the pipe C a vessel I is jointed to one arm of a rocking bell-crank lever in such a manner that it is able to sink below the lowest water level. The lever is, on the other hand, connected by a rod L with the arm of a spindle Q, passing outwards and driven by the coin-freed mechanism O, by means of a rod N and a second arm P.

When a coin is inserted, the vessel I is displaced by the coin-freed mechanism O into the position below the lowest water level, so that the gas may be able to flow through the pipe C into the measuring drum. When the quantity of gas which has been paid for is nearly exhausted, the vessel I is raised by the action of the registering mechanism to such an extent that the pipe C becomes immersed in the liquid carried by the vessel, and so the passage for the gas is blocked. As soon as the lower edge of the pipe C rests in the liquid in the vessel I (owing to the pressure of the gas and to capillary action), a portion of the liquid penetrates between the pipe and the body R, and, owing to the small space between the two, no appreciable fall in the level of the liquid takes place in the vessel, which is made of adequate width, so that a reliable blocking of the current of gas is effected without deep immersion of the pipe C.

Communication is established between the liquid contained in the chambers A and F, and likewise in the measuring drum casing, by the opening S, the lower edge of which is somewhat below the lowest permissible water level, and which, for preventing gas from rushing through, opens into a passage T, the length of which corresponds to the highest gas pressure. Owing to this arrangement, when the seal is closed but the float valve (owing to the deposits of rust or the like) is not closed quite tightly, the level of the liquid would be forced down so low in the chamber A that a further transfer of the liquid through the opening S and the passage T into the measuring chamber cannot take place, and a corresponding quantity of liquid is able to flow through the passage G in the water reservoir U. When a conical or tapering seal pipe C is employed, and a corresponding entering body R, the level of the liquid in the chamber A falls in correspondence with the throttling of the gas current by the gradual penetration of the body R and the excess pressure thereby arising in the chamber A, whereby the float valve closes first slowly and then suddenly, as soon as the gas pressure on the valve V exceeds the buoyancy of the float Y.

In order to prevent premature closing of the gas current by this means, the float valve is formed as a double valve with the two valve cones V and W, in such a manner that the valve body V likewise serves as a seat for the valve body W, and is displaceable to a limited extent upon the neck of the latter. When the valve body V is pressed upon its seat, the valve body W remains raised by the float Y in the open position so long as the capacity of its passage is smaller than that of the seal. It is then possible for a small quantity of gas to pass through. It is only when the seal is completely closed that a further fall in the level of the liquid in the chamber A, and the consequent entire closing of the valve body W, take place.

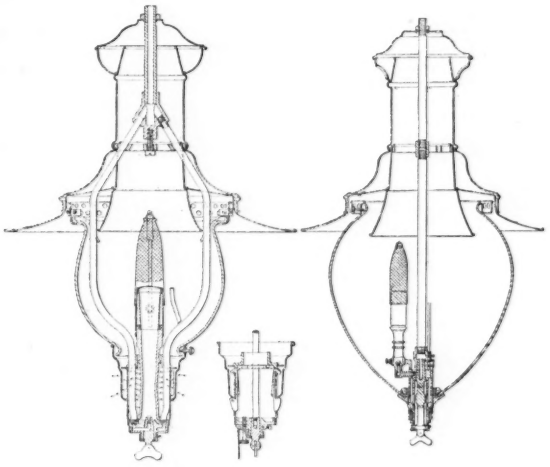
High Pressure Gas-Lamps.

KEITH, J. & G., of Farringdon Avenue, E.C.

No. 1454; Jan. 19, 1906.

This invention relates more especially to incandescent lamps for use with high-pressure gas, with the object of providing "a simplified and practical construction in which the air supply to the burner or burners is adjusted from outside the lamp."

The burner is substantially similar to that described in patents No. 26,198 of 1901 and No. 2072 of 1904, and is arranged to slide vertically in a tubular casing fitted at the foot of the lamp and kept central by four fins. A helical spring fitted within the casing presses on the fins so as to keep down the burner; and a milled-headed screw is arranged to bear on the bottom of the burner, so that, when screwed inwards,



Keith's High-Pressure Gas-Lamps.

the body of the burner is raised. The air is admitted to the burner as described in the earlier patents, so that when the burner body is raised the air supply is increased, and when depressed the air supply is decreased. As the milled head of the screw projects outside the lamp, the air supply to the burner may be conveniently adjusted when the lamp is burning.

In the second construction of (three-burner) lamp, the burner bodies are made on the principle set forth in the earlier patents; but, instead of the ring into which the body of the burner is usually screwed being attached to the bottom of the burner containing the gas nipple, it is attached to a vertically sliding sleeve. The nipple portion of the burner is attached to an arm, which is, in turn, directly secured to the gas-supply stem, and which passes through a slot in the sleeve.

Two, three, or more burners can be attached to the sleeve, which can be slid vertically by rotating a threaded ring fitted outside the body of the lamp. In this way, the air supply may be adjusted by increasing or decreasing the size of the annular opening between the nipple holder and the bottom of the burner body.

Each burner can be separately adjusted in the ordinary way if desired.

Gas Analysis Apparatus.

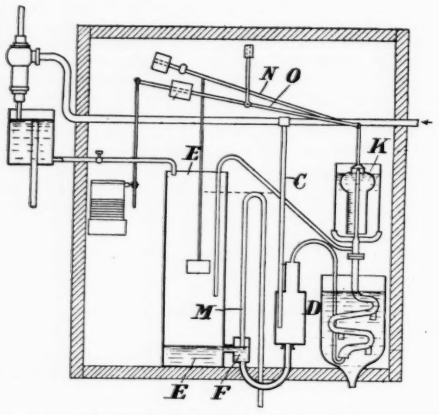
SCHATZ, E., of Frankfort-on-the-Maine.

No. 3417; Feb. 12, 1906. Date claimed under International Convention, May 11, 1905.

This is a modification of the plant described in two previous English patents—No. 25,466 of 1905, and No. 1841 of 1906—with the object of obtaining an exact automatic registration of the results of an analysis while it is being made.

The measuring chamber D (p. 778) is like a bottle, and is placed exteriorly of the tank E; while the bottom of the chamber is connected with a chamber F, at the side of, and in communication with, the tank. A pipe opening into the chamber F serves to automatically withdraw the liquid from the tank when it has risen to the bend of the pipe M. The gas-inlet pipe C extends up to near the bottom of the measuring chamber, so that, when the lower extremity of the pipe is sealed by the liquid, the measuring chamber contains exactly 100 cc. of gas. The needle of

the beam O forms an obtuse angle with the arm carrying the bell; and this needle is provided with a weight so that the increase in the weight of the bell, which takes place in proportion as it comes out of the liquid, is compensated for. Finally, the casing enclosing the apparatus supports the axis of oscillation of a lever N, the shortest arm of which carries a weight; while the longer arm is provided with a float, which plunges into the tank E.



Schatz's Gas Analysis Apparatus.

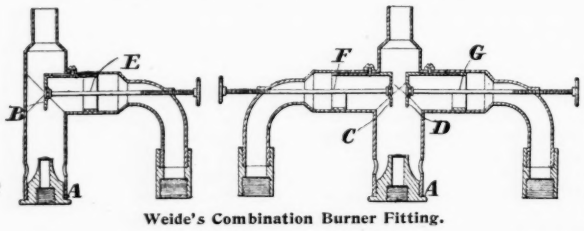
When the level of the displacing liquid falls in the tank and measuring chamber, the gas which has just been analyzed will escape from the bell K, in view of the fact that the lower end of its connecting pipe has become unsealed in the tank E. Simultaneously, the gas to be analyzed is aspirated by the pipe C into the measuring chamber D. When the liquid again rises in the tank E and measuring bottle D, it seals first of all the lower end of the gas-inlet pipe C, thus enclosing 100 cc. of fresh gas in the measuring bottle, under atmospheric pressure. As the displacing liquid continues to rise, this volume of gas is forced into the absorption chamber, and from this into the bell K. The latter rises in consequence, so that the style of the registering device is lowered to a corresponding extent and registers the amount of the absorption, as well as the final result.

Combining Vertical and Inverted Gas-Burners.

WEIDE, A., of Frankfort-on-the-Maine.

No. 6578; March 19, 1906. Date claimed under International Convention, March 18, 1905.

This invention relates to a distributing device for a series of burners, so as to make it possible from one common mixing-chamber to feed several burners in such a way that the quantity of gas and air supplied to each may be either adjustable and controllable (whereby lamps of different consumptions can be connected to one pipe and also interchanged with each other according to requirements) or constant.



Weide's Combination Burner Fitting.

The illustration shows two methods of carrying out the invention, for lighting two lamps (one upright and one inverted) or three lamps (one upright and two inverted).

Through the nozzle A the gas enters a common mixing-chamber, the transverse section and inlet openings for the air of which must be in accordance with the greatest number of lamps required to be lit. Here, by means of the partition-walls B, C, D (which are sharpened at the bottom to prevent an unnecessary hindering of the passage of the gas), a division of the gas and air mixture is made, parallel to the axis of the pipe, whereby the strength of the branch-currents produced depends on the sectional area of those portions of the mixing-chamber separated by the respective partition wall. By the partition walls (whose number is one less than that of the lamps), the proportion of the transverse section of the branch-currents produced is fixed; and an exchange of lamps of varying gas consumption is not feasible. When the latter is necessary, the walls must be disposed so as to be movable, and must further be connected with the respective branch-pipes in such a way that the required amount of gas reaches the respective lamps.

For this purpose, the slide valves E, F, G (which consist of partly split pipes, and whose interior end is formed by the partition walls), are movable in the branch-pipes, which serve to them as slides. The latter can be disposed at different angles with reference to the central vertical pipe, as may be required. For instance, when one upright and one or more hanging incandescent lamps are used, they would be disposed at right angles, and when several upright lamps are used at an acute angle upwards, "to prevent sudden and considerable changes in the direction of flow of the gas and air mixture, and consequent loss of velocity through excessive friction."

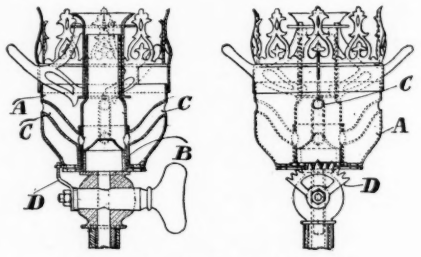
The area of the transverse section of the gas and air current for the lamp which has no special slide-valve is regulated by the respective position of the slide-valves one towards another; these valves being provided with grooves in which adjusting screws engage, to prevent any turning movement of the valves. The movement of each of the slide-valves is preferably independent of the others, and is caused from outside the apparatus by means of spindles, with handles for the exact adjustment of the spindles, which are disposed fixedly or rotatably within the slide-valve or its front wall.

Regulating Device for Incandescent Gas-Burners.

WERWATH, E. H. O., of Linden, near Hanover.

No. 7276; March 26, 1906.

The patentee proposes to connect the valve for the outside air for an incandescent gas-burner with the slide for the openings in the bunsen tube (either rigidly or by other means), so that simultaneously with the adjustment of the openings admitting air, the openings in the bunsen tube are also regulated in such a manner that the required equilibrium between the amount of air drawn in, both outside the mantle as well as inside the bunsen tube, is maintained independently of fluctuations of suction. It is also easily arranged that a certain position of the mutually regulating slide for the two air passages of the burner corresponds to each position of the gas-cock; so that on turning the cock this air-slide is simultaneously suitably adjusted by connecting gear. Similar adjustment has, it is said, already been done in the case of the internal supply only.



Werwath's Gas-Burner Regulator.

As shown, the lower enlarged part of the burner-tube is enclosed by an upwardly enlarged casing A, closed below by a flat annular disc resting on a slide ring fitted to the bunsen tube. Both ring and disc have perforations of suitable size, so that on turning the casing on the ring the air entering the interior of the former, and from here conveyed externally to the flame, can be regulated. Into the lower part of the casing, a cylindrical slide B is fitted, closely encircling the enlarged part of the bunsen tube, and is rigidly connected with the body of the casing. The cylindrical slide B has perforations similar to, and facing, the usual lateral perforations in the bunsen tube; and from these perforations straight or bent tubes C extend through the inside of the casing to the outside wall of the latter—communicating here with the outside air. These tubes, which supply air to the openings in the bunsen tube, allow of the supply of air to it, together with the supply of air to the flame from outside, being regulated by turning the casing.

As the amount of air to be supplied inside and outside is in a given proportion to the gas supplied through the ordinary nozzle into the burner-tube—the quantity of gas being determined by the respective position of the gas-cock—the casing A can also be arranged in such a manner that it is compulsorily correctly adjusted by the turning of the burner cock. In the arrangement shown, a toothed segment D, attached to the cock, is provided for this purpose; the segment meshing with another toothed segment provided on the casing.

The slide regulating the outside air can also be arranged above the air-inlet apertures in the burner-tube, more or less closely, either under the lower opening of the burner gallery or the chimney. In this case, the outside casing can have perforations, and the air-tubes passing through the casing can be omitted.

Lastly, also, instead of combining the slides for the air-passages in one rotating part, any other mechanical device can be employed by means of which the two air-passages are opened or closed respectively at one time in given proportion.

Extracting Sulphur from Spent Gas Purifying Materials.

BECIGNEUL, J. J. M., of Nantes, France.

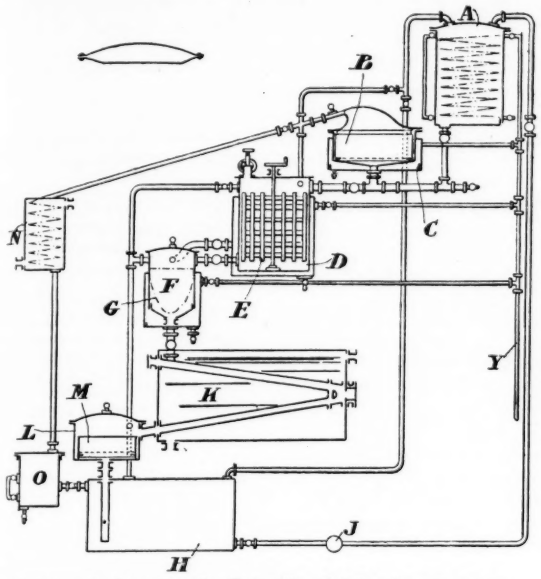
No. 9800; April 26, 1906. Date claimed under International Convention, April 25, 1905.

This is an improvement upon the process and apparatus described in patent No. 8530 of 1905, for extracting sulphur from spent gas purifying materials by means of hot toluene.

The patentee has found that, instead of effecting the filtration of the toluene by passing it through the animal charcoal or bone-black as described in his prior patent, it is advantageous to agitate the toluene therewith; and this improved apparatus comprises a vessel adapted to effect the agitation. It is also advisable to continuously cool the toluene in thin wrought-metal tubes, preferably of lenticular section and having a flattened side or wall. Further, in order to enable the toluene to be run from vessel to vessel without the necessity for opening air-cocks (which are liable to allow toluene vapours to escape into the atmosphere), it is desirable to establish an equal pressure throughout the apparatus. As regards the process, the improvements further relate to the nature of the forms of finely-divided carbonaceous material which can be employed with advantage for retaining the tars extracted by the toluene from the spent materials, and also to the addition to the toluene of carbon tetrachloride, which is itself a solvent of sulphur and renders the toluene practically non-inflammable.

The accompanying drawing illustrates the improved apparatus. A

general view of the apparatus is given, and a section of one of the cooling tubes for the sulphur-charged toluene.



Becigneul's Apparatus for Extracting Sulphur from Spent Gas Purifying Materials.

The cold toluene from (say) the reservoir H, in which it is collected at the end of the operation and from which it is raised by the pump J into the reservoir A, is heated to a temperature of about 105° C. by a steam coil. Instead of using pure toluene, it is preferred to employ a mixture of toluene and carbon tetrachloride, which renders the toluene practically uninflammable without reducing the solvent property of the liquid upon sulphur.

The heated toluene or mixture is led into the vessel B, in which is fitted a basket containing the spent purifying materials to be treated. The vessel B has a steam-jacket C and a removable cover, which can be opened by turning it on a shaft or axle; and it is surmounted by a wide neck so as to allow the toluene vapours to escape readily under the action of steam admitted at the required time for driving off the solvent absorbed by the spent materials, as about to be described. This steam is likewise admitted at the bottom of the vessel B by the pipe shown.

When the toluene has remained in contact with the purifying materials in B for a sufficient length of time to dissolve all the sulphur, it is run into the vessel D, provided with a steam-jacket. When all the toluene has been run from B into D, the toluene with which the spent material remains charged is vaporized and driven off by admitting steam through the pipe shown.

The toluene run into the vessel D is charged with sulphur in solution, and it likewise contains tars; and the treatment with the finely-divided carbonaceous material is effected in the vessel. The material is introduced through a charging aperture at the top; and the solvent and carbonaceous material are agitated and intimately mixed together by an agitator of any suitable kind—for example, by a rotary stirrer E mounted on a vertical shaft. Complete absorption of the tars by the carbonaceous material can thus be effected.

For this purpose any of the finely divided forms of carbon may be employed, and "in general, any finely-divided carbonaceous material such as coke, wood charcoal, and even calcined tars." When the operation has been carried on for a certain time with fresh carbonaceous material, this will have become charged with such a quantity of tars that it is necessary to revivify it by calcination. In this way, the absorbed tar, which is reduced to a finely-divided condition, is carbonized during the revivification, and is itself converted into a suitable material for absorbing the tars; "so that the substance revivified in this way is more active than the fresh material."

After the toluene charged with sulphur and tars has been agitated for some time with the carbon, the mixture is allowed to settle, and the carbon falls to the bottom of the vessel D as sludge. The clear liquid is run off into the filter F by the upper pipe, and the muddy liquid is run off by the lower one. The filter F is disposed in a vessel G, fitted with a removable cover for allowing the filter to be changed. The vessel G has likewise a steam-jacket.

The clear liquid, in passing through the filter F, deposits in it any carbonaceous material it may contain; and it is thence run into the pipes in the vessel K, through which an upward circulation of cold water is maintained—the vessel being provided for this purpose with inlet and outlet connections. The hot sulphur-charged toluene runs down through pipes which are of lenticular section, having an almost flat side or wall, as shown on a larger scale in the detail. These pipes are of thin wrought iron or metal, and are slightly inclined. As the result of the cooling action, the sulphur separates out, but it is carried along with the toluene into the vessel L.

The sulphur suspended in the toluene is arrested in a basket M provided with a wire gauze bottom, while the liquid runs through into the vessel H. The straining vessel L is fitted with a removable cover, to allow of withdrawing the basket M from time to time to remove the sulphur.

As already explained, the toluene absorbed by the purifying materials in the vessel B is vaporized by the steam admitted through the materials. The toluene vapour and steam pass off to the condenser N, which is cooled by the circulation of cold water, and the water of condensation and liquid toluene run into the separator O, where the two liquids separate by gravity. The water falls to the bottom, and is run off by the purge cock at the bottom; while the condensed toluene is returned to the reservoir H. The whole of the liquid toluene, mixed or not with tetrachloride of carbon, is thus recovered and returned to the general circulation, as explained.

The carbon or carbonaceous material collected in the filter F and the sulphur deposited in the basket M are dried in vessels of any suitable kind, which are common for a number of sets of apparatus, so that the toluene with which the substances are impregnated can also be recovered—thus avoiding any loss of the solvent.

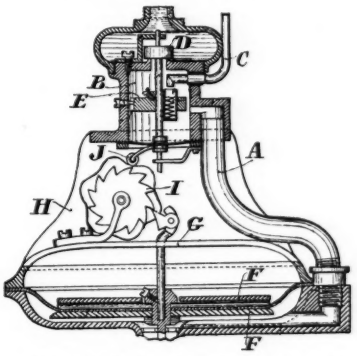
All the vessels and chambers composing an apparatus are connected together by pipes serving to equalize the pressure throughout all the vessels and chambers, so as to allow the liquid to be run quickly from vessel to vessel without loss. Y is a steam-pipe admitting steam at about 105° to the vessel A for heating the toluene therein and for supplying the steam circulation through the jackets of the steam-jacketed vessels, so as to keep the toluene at a suitable temperature, since it is only in the vessel K that the cooled toluene is caused to give up its sulphur.

Gas-Lamp Lighting and Extinguishing Device.

LIED, O. S., of Christiania, Norway.

No. 9982; April 28, 1906.

This gas-jet igniter and extinguisher operates by causing the pressure in the supply pipe to rise for a short time and then fall again, whereby a bell, a piston, a diaphragm, or the like, is moved in order to feed forward a rachet-wheel, which causes the supply-valve of the gas-jet to open or close, and so ignite or extinguish the jet.



Lied's Lamp Lighting and Extinguishing Device.

The gas on entering passes by the passage A, chamber B, and pipe C to the pilot light; the gas supply to the main central jet being closed as long as the valve D rests on its seat drawn downwards by the weight of the disc E on the valve stem. Above the inlet pipe is a diaphragm, loaded by plates F or other weights. The diaphragm is provided with a central stem guided in the strap G, and the upper end of which projects into a freely accessible chamber H, in which is arranged a ratchet-wheel I, provided with projections or cams. A pivoted pawl engages with the wheel.

The chamber B is closed at its lower end by a flexible diaphragm, connected to the lower part of the valve-stem, which at its lower and upper parts is controlled by fixed arms. Beneath the lower inlet of the pipe the disc E is provided with a sleeve C having an internal spring, which tends to press a plug or stopper upwards. The disc is prevented from turning by means of a screw, the inner end of which engages with a longitudinal groove in the disc E.

The operation of the mechanism is as follows: As soon as the pressure in the supply pipe is increased, the large lower diaphragm is lifted, and causes the pawl to turn the rachet-wheel I one tooth forward, so that the top of one of the cams is moved beneath the roller J secured to the valve stem. The valve D is thereby slowly raised, and admits gas to the main burner; while the pilot-light ignites the main jet. The pilot-light will then be extinguished by the plug referred to being operated by the spring to close the lower inlet of the pipe C. The pressure is then again lowered, whereby the diaphragm, together with the attached stem, is lowered to its normal position, and the pawl engages with the following tooth, the ratchet wheel I not being operated.

If the main jet is to be extinguished and the pilot-light ignited, the pressure in the supply pipe is again increased and then lowered, so that the ratchet-wheel is moved forward one tooth more, and the roller J passes into the depression between two of the cam surfaces; the valve D being closed at the same time as the gas is admitted at C, whereby the main jet, after having ignited the pilot-light, is extinguished. The parts will then be in the position shown.

APPLICATIONS FOR LETTERS PATENT.

19,580.—BARNES, J., "Incandescent fittings." Sept. 3.

19,624.—ROBERTSON, J., and WILLANS AND ROBINSON, LTD., "Filtering gas." Sept. 3.

19,738.—DUCKETT, J. B., "Cooking-stove burner." Sept. 5.

19,753.—FISCHER, H., "Inverted burner." Sept. 5.

19,754.—M'EWAN, J., "Purifier covers." Sept. 5.

19,758.—LEE, H. & F., "Gas and oil stoves." Sept. 5.

19,788.—BROWNE, G. D. G., "Burners and mantles." Sept. 5.

19,959.—BRIGGS, W. M., "Valve for gas, &c." Sept. 7.

19,967.—TICE, W., and BIBBERO, M., "Anti-vibrators." Sept. 7.

19,978.—WARRY, J., and ARCULUS, G. N. & E. A., "Inverted incandescent lamps for railway carriages and tram-cars." Sept. 8.

20,042.—STILL, W. M., and ADAMSON, A. G., "Mantles." Sept 8.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by Correspondents.]

Inverted Burners for Street-Lighting.

SIR,—In your issue of the 28th ult., p. 570, you state that Edinburgh is in a pioneer position in the application of inverted incandescent gas-burners to street illumination.

I wish to state that the Holywood Urban District Council adopted the New Inverted Gas Light Company's burner last year. The burners are fitted into the existing lanterns in the same way as was shown in the illustration in your issue of the 4th inst., p. 643. An ordinary bye-pass is connected from the tap to the inside of the globe. The burners are giving great satisfaction.

THOS. FRIZELLE.

Holywood, Co. Down, Sept. 11, 1906.

Gadd's Gasholder Patent.

SIR,—Since your publication, on Aug. 21, of the abridged specification of my new invention for giving a vertical movement to gasholders when supported by spiral guides, and which is accepted by the British Patent Office, inquiries have reached me as to the results of my applications for patents therefor in foreign countries—more particularly in the strictly examining countries like the United States of America and Germany.

Of course, I have answered private inquiries by letter; but as probably others of your readers are also interested in this matter, it may be well to state (1) That the United States have already allowed the patents applied for, without having made the slightest objection, citation, or demur of any kind to the wording of the specifications filed, or to the claims; (2) that neither has Germany, Austria, or any other country made any citation; and (3) that France, Belgium, and Italy have already issued the patents.

It is also important to note that, under the present patent law, a strict search as to novelty is now made in the British Patent Office; and, therefore, acceptance of a specification (without any disclaimer) in this country, is probably as good a guarantee of novel subject-matter as that of any other state—Germany and the United States included.

W. GADD.

Manchester, Sept. 10, 1906.

An Opportunity Lost at Limerick.

SIR,—There is at present being held in Limerick a Munster-Connaught Exhibition for the Encouragement of Irish Industries. The Railway Companies are running cheap excursions into Limerick every day from the various towns in Munster and Connaught as well as from other parts of Ireland. In a great many places a general holiday is proclaimed, so as to give the inhabitants an opportunity of visiting the exhibition.

I went down to Limerick in company with a large number of our gas consumers and the inhabitants of the town generally. I thought I would have an opportunity of showing some of our consumers the latest thing in up-to-date incandescent gas lighting, as well as other appliances in connection with gas lighting. I never was so disgusted in my life as when I saw the poor display (if it can be called a display) the gas industry is making.

What had I to show our consumers in up-to-date incandescent gas lighting? Half-a-dozen incandescent gas-burners, with broken mantles, lighting a stand belonging to one of the firms of gas-stove makers. This stand was all that represented the gas industry; and to show what benefit even this one stand is, I might mention that I was able to secure an order from one of our consumers for a cooker.

Several of the firms of gas-engine makers have stands, and one would expect they would show an engine working with coal gas. Instead of this, their engines are working with suction-gas, generating electricity. Several electric lighting firms have stands, and also firms connected with the acetylene gas industry. Most of the lighting is done with electricity; and the power is also supplied by electricity. Part of the grounds are lighted by acetylene gas. A model Irish cottage is lighted with acetylene gas, which would have been a unique opportunity for displaying a slot installation.

The exhibition will not close until the end of October; and perhaps something could be done before then to show the Irish public that gas is not a thing of the past. To show the enterprise of our friends the electricians, I find that the Corporation Electrical Engineer is the Honorary Electrical Engineer to the exhibition.

When I was returning home, a gentleman asked me if there was any gas in Limerick, as he did not see any sign of it at the exhibition. I had sorrowfully to admit that there is a gas-works in Limerick.

The exhibition is well worth a visit, and is a credit to the people of Limerick, and I also must admit to the Electrical Engineer; but it is humiliating to a gas manager.

AN IRISH GAS MANAGER.

Sept. 10, 1906.

The "Midnight Sun" Burner.

SIR,—We received your "JOURNAL OF GAS LIGHTING" safely, and have read your article on our "Midnight Sun" burner, and noted that you find on trial it did not give 500-candle power.

We would point out that it depends on the pressure and quality of the gas, as to whether we get 500-candle power from it. For instance, you say that it burns 9 feet of gas to give its best light. Here, it gives its best light at 7 feet an hour. We have fitted up over 70 shops in this town with the "Midnight Sun" burner, and 100 in Brighton and Hove, and have had nothing but praise for it. We enclose you an unsolicited testimonial from a firm who have three shops in Brighton and Hove.

We are very disappointed with the notice you gave us, especially as you did not state the candle power of the burner, and leave the public to imagine what it is. We need hardly say that we have not received a single inquiry *re* burner, which is hardly to be wondered at after reading your article. If you would be kind enough to state in your valuable paper the candle power the burner actually gave at 9 feet an hour, you would greatly oblige

THE MIDNIGHT SUN COMPANY.

Worthing, Sept. 10, 1906.

[We are sorry that our correspondents are not satisfied with the notice of their burner which appeared in our issue for Sept. 4. The object in publishing such notices is to give information, and not to advertise with the view of obtaining inquiries for the vendors. There is another place in the "JOURNAL" in which advertising may be done in the customary manner; but this does not weigh with us in conscientiously dealing with new inventions. Again, trials made of burners are not for the purpose of giving figures that may be used for advertising purposes. They are carried out merely to satisfy ourselves as to the validity of the claims of inventors, manufacturers, and others; for advertising purposes, there are professional photometrists pleased at all times (for a fee) to test burners, and give a signed certificate as to their capability. Our correspondents give themselves completely away as to their knowledge of illuminating powers. We are perfectly aware of the dependence of burners and their illuminating power on "pressure and quality" of gas; but there is no burner going that consumes, under any ordinary district pressure, only 7 or 9 cubic feet of gas per hour that will give 500 candles. Burning 9 cubic feet of 16-candle gas an hour, the suggestion of an efficiency of 55 candles per cubic foot was amusing enough; but 7 cubic feet of 16¾ to 17 candle Worthing gas—if the best light is 500 candles—would equal to an efficiency of 71 candles per cubic foot! If the 55 candles was amusing, this is —— a fitting expression fails. We have no room to deal further with such absurdities. As to the testimonial referred to, it does not give any confirmation of the exaggerated claim made for the burner; but it speaks of the satisfaction of the user. This is not surprising. In our notice, it was made quite clear that the light was a good one; but it was impossible to subscribe to the extraordinary liberal view of our correspondents in their printed circulars.—ED. J.G.L.]

Further Capital at Southampton.

At an extraordinary general meeting held last Wednesday week, the proprietors in the Southampton Gas Company authorized the Directors to raise, as required, £100,000, by the issue of ordinary or preference stock, and £33,333 in 4 per cent. debenture stock. The Chairman (Captain A. J. Corse Scott, J.P.) explained that the business had extended rapidly; and that, as the Company's borrowing powers were exhausted, it had been necessary to go to Parliament. The Bill had gone through without opposition; and now the Board were wishful to take advantage of the further powers it gave them. They were convinced that they would be able to meet their growing requirements for a long time to come. The issue of fresh capital was a sign that the Company were progressing; and when they would cease to want more capital, it might be said that they had come to the end of their tether. Of course, there had been give and take in connection with their new Act; but he did not see why the Company should not, under it, be as successful in the future as they had been in the past. The Directors proposed issuing from time to time, and as they considered necessary, new stock, either by public auction or by tender, of which the shareholders would have due notice.

Claims against the Nottingham Gas Department.

It was announced in last Tuesday's "JOURNAL" that two writs had been served upon the Nottingham Corporation, in respect of an action for an injunction regarding the operations at the Basford Gas-Works. The plaintiffs are Messrs. Shipstone and Sons, Limited, brewers, and Messrs. Henry Ashwell and Son, bleachers; and they allege that their private wells at Basford have been polluted by the percolation of matter from the gas-works. The City Council have elected a Committee to take charge of, and defend, the interests of the Corporation in the proceedings threatened, as well as any others of a like character which may be commenced by other persons or companies. The Committee are further empowered to arrange terms with the complainants for settlement, or to refer the matter to arbitration, and to order the execution of such works as may be required for the abatement of any ground of complaint, if such shall be found to exist. In addition, the Town Clerk has been authorized to engage Counsel and witnesses. All costs and expenses incurred are to be paid out by the gas undertaking.

Water Scarce at Long Eaton.—The Surveyor reported to the Long Eaton Urban District Council last week that since Aug. 30 it had been found necessary to cut off the water supply from 11 p.m. to 6 a.m. Since then, in consequence of a more serious diminution, it was found imperative that some temporary means should be provided for supplementing the existing supply. Messrs. Hodson, of Loughborough, and himself had traversed the whole district in search of available supplies; and the firm were authorized to proceed at once with all necessary arrangements for the adoption of the scheme best suited to meet the exigencies of the case. The Water Sub-Committee had in these circumstances deemed it necessary to take further steps to conserve the supply, which would now only be available between the hours of 6 a.m. and 9 a.m., 12 noon and 2 p.m., and 6 p.m. and 9 p.m. The Council are at present saving about 100,000 gallons a day.

MISCELLANEOUS NEWS.

PUBLIC LIGHTING OF SHEFFIELD.

Electricity *v.* Gas.

In connection with the proposal to light Sheffield Moor with electricity, at an increased cost of £30 over the present charge for gas, Alderman Marsh, at last week's meeting of the City Council, said he did not believe such lighting would be an improvement. The Sheffield streets lighted with gas were as well illuminated as any in England. He saw no reason why the Council should subsidize the Electric Light Committee at the expense of the Tramways and the Watch Committees, and to the detriment of the ratepayers. The same view was taken by Mr. Cattell, who moved an amendment to refer back the part of the minutes dealing with this matter. The vagueness of the Electric Light Committee's estimate, he contended, put the Council in the difficult position of being asked to vote an amount of money of which no one knew the extent. Arguing from the relative cost of lighting the Town Hall, he claimed that the cost of electricity on the Moor would work out at £600 or £700, as compared with £193 for gas lighting. The Gas Company had served the city well; and to take away from them a portion of their business would not only be an injustice to the Company, but also to the city at large. By making gas in enormous quantities, they were able to sell cheaply; and thus it followed that if the production was to be lowered, the general consumer could not look forward to reductions in the price of gas. Gas was also supported by Alderman Eaton and Mr. Nuttall; the former remarking that in portions of London where they had been using the electric light they were now doing away with it considerably, and the latter that gas had been very satisfactory.

Mr. Bennett, however, said they had it distinctly stated that the cost for electric light would be only £30 more than was being paid for gas. The extra cost to the rates of the city would only be £30; and even if the cost worked out at more than the estimate, it would come out of the electric light undertaking. In spite of what the Chairman of the Gas Company might say, the Council ought to do something to utilize the resources of their own electric supply for street lighting. If the Corporation had the lighting of all the Sheffield streets, in the same way as the Gas Company, they would soon be able to extend consideration to consumers. To carry out what was proposed would be an advantage all round. On the other hand, Sir Charles Skelton objected to making experiments in Sheffield when the same experiments had been tried over and over again elsewhere. The Council, he said, ought to learn by the experience of others. At Moorhead an example was furnished as between gas and electric light for illumination—the incandescent gas lamps had put the arc lamps into the shade. Electricity was right for indoors; but for street lighting, it was sheer folly. He was followed by Mr. Crowther, who said that it was unfair to draw comparisons between the £19,000 the Gas Company paid to the city in rates and what the Electric Department paid. The fairer way was to take the whole of the rates of the Corporation into consideration. If the £10,000 or £12,000 now paid annually to the Gas Company were to be paid to the Electric Light Department, the surplus over the cost of production which went to the shareholders would go for the benefit of the ratepayers. The whole question of cost in supplying the city with electricity was not how much the department charged, but what was the actual cost of producing the current. Sheffield was far behind other cities in supporting the Electric Light Committee; and he was strongly in favour of the resolution, as being a sound step in the right direction having regard to the future.

Alderman Styring, the Chairman of the Electric Light Committee, called attention to the fact that when the Highways and Tramways Committees contemplated alterations along the Moor, his Committee decided to have a hand in the affair. The Joint Committees considered the proposals emanating from the Electric Light Committee; and having regard to all the circumstances, it was considered advisable to have Sheffield Moor lighted by electricity. It was intended to move the standards from the centre of the street; and one important reason why they decided to adopt electric lighting was because the poles that were to be erected on either side of the street could be used for electric lamps as well as serve the purpose of carrying the tramway wires. Before coming to a conclusion on the matter, the Watch Committee asked for full particulars of the scheme. These were supplied to every member of the Committee. He was surprised, therefore, that Mr. Cattell should state that full particulars were not forthcoming, and surmise that the cost of the innovation would be much larger than the estimate. The Electric Light Committee had undertaken all the capital expenditure; and therefore the other Committees would be on just the same footing as if they lighted the street with gas. Mr. Cattell was quite beside the mark in stating that the cost would be £800; and it was distinctly unfair to have put before the Council the exaggerated figures he had done. The Electric Light Department had given a specific figure of £260 for the lighting of the street; and he wondered what grounds there were for the proposer of the amendment to try to frighten the Council by submitting figures got together in an irresponsible way. In giving the price of £260, the Electric Light Committee had quoted one that would involve them in no annual loss—this the Council could take for granted. It had been the custom to tell the Electric Department that they did not meet the Corporation on the best terms; but now they had done so they were told they would ruin themselves. The straight and fair issue before them was as to whether they were to be dominated by the Gas Company, and the Gas Company's friends in the Council, or whether they were going to manage their own affairs. It was for the Council to do their best to make the electric light undertaking a success. They were not asking, however, that the undertaking should be subsidized. He contended that the arc lamps would maintain the standard of light set up; whereas everyone knew that incandescent mantles rapidly deteriorated. It was no use sending the matter back for further information. They had to decide whether they would make the experiment or not. He asked that the amendment should be rejected, and that this much-discussed matter should now go through.

The Committee Chairman's speech was followed by remarks from several other members of the Council. Mr. Appleyard thought the work should not be further delayed, and that the idea of £90,000 having been saved on gas was a fallacy. Alderman Uttley sympathized with the Electric Light Committee, but could not be a party to paying more for one good light than for another good light. Mr. Kelley was of opinion that the whole of the facts went to show that electric light for outside lighting was not the success it was for indoors. The Gas Company had served the city well, and to take away the custom from them would have a serious effect. The introduction of the electric light to the Moor was only the thin end of the wedge. Mr. Shaw ridiculed the idea of the Gas Company being affected by the withdrawal of £200 a year from their revenue, and said no one thought the side streets would be illuminated by electricity. Mr. Padley stated that he was in favour of electricity as a better illuminant. Anyone noticing the lights outside the Town Hall, would recognize the truth of this; and he thought that the improvement in lighting power would more than compensate for the increased cost. Lastly, Mr. Whiteley pointed out that electricity could only be tested by experimenting with it; and he said it seemed to him that there were some people who were afraid of the electric light being too great a success.

On being put to the vote, the amendment was lost by a large majority.

NOTTINGHAM GAS QUESTION.

Discussion in the Council.

At the Meeting of the Nottingham City Council on Monday of last week, a long discussion arose in consequence of a question asked by Dr. Brown Sim—namely, by whose authority an advertisement was inserted in the Press for applications for the appointment of Superintendent of the Eastcroft Gas-Works. Mr. J. Ashworth, the Acting-Chairman of the Gas Committee, replied that it was by the unanimous vote of his Committee; and this answer led Dr. Brown Sim to move a resolution, eventually slightly amended—"That when applications for the appointment of Superintendent of the Eastcroft Gas-Works have been received, the appointment shall be made by the Gas Committee subject to the approval of the Special Investigation Committee."

Speaking to his resolution, Dr. Brown Sim remarked that he regretted to have the duty of bringing this matter before the Council; but the Special Committee appointed on June 11 were still pursuing—somewhat slowly perhaps—their investigations, and certainly they ought to leave the Gas Committee as well as they could in their depleted condition to manage as best they could. But the Council would remember that a resolution was moved to the following effect: "That a Special Committee of this Council be appointed to investigate and report upon the present condition and working of the gas undertaking, and of any improvements or alterations necessary to be made therein; and with full powers to terminate the service and to appoint any official or officials of such undertaking, and to obtain any expert or other advice or assistance that such Committee may consider desirable; and that such Committee consist of five members." It therefore appeared to him that the intention of the Council, when they passed this resolution, was that while the investigation was proceeding the Gas Committee ought not to have power to appoint any officials, and that this duty should rest with the Special Committee. [Mr. Black: No.] He was no lawyer; but that seemed to him the plain meaning of the resolution. He would remind the Council that when the late Chairman of the Gas Committee was speaking a short time ago, he informed them that there was a Superintendent of the Eastcroft Works who had been removed to some other department. At this point the Mayor said he was advised that Dr. Brown Sim was out of order; and he resumed his seat.

The motion was seconded by Dr. Fraser, who thought the Gas Committee were falling into a most deplorable mistake in making a further appointment while the whole question was under review. When the Special Committee were appointed, it was expressly stated that they were to be endowed with power to remove and appoint officers. Surely until this Committee had reported, it was of the utmost importance to the Council that the whole matter should remain in its present condition. If the appointment of a Superintendent had suddenly become necessary, the least that could be done was that the Special Committee should be a party to such an appointment. There had been many deplorable mistakes made, or alleged to have been made, by the management of the Gas Committee; and he sincerely hoped the Council would not seek to add to the number. He did not wish to import into the discussion a single word more than was necessary; but while the management of the undertaking was, so to speak, under trial, if an appointment was to be made at all, it should be made with the full sanction of the Committee.

Mr. Ashworth said that, as Chairman of the Gas Committee, he should like to explain their position. They had no Manager or Superintendent at Giltbrook, and no Superintendent at Eastcroft. There were times when the output of gas reached 10 million cubic feet per day; and their utmost storage capacity in the three works was something like 8½ million feet. He wished to know what was going to happen in case of accident, seeing that there was no Superintendent on the works? Was the Manager supposed to do everyone's work? The Investigation Committee had been sitting now for three months, and from what he could hear might go on for another three. With the winter approaching and greater pressure on the works, it was to the interest of all concerned that the appointment should be made. At all events, if anything went amiss the fault would not lie with the Gas Committee. If matters went on for another three months, they might find themselves in a very serious position; and who was going to take

the responsibility? He admitted that the resolution referred to by Dr. Brown Sim gave the Investigation Committee power to appoint and discharge; but it did not say the Gas Committee or its remnant had not also that power. Personally, he thought it quite time the question was settled. The Gas Committee had been made a target of, and shot at, not only by the ratepayers, but by outsiders writing to the Press, and by their fellow councillors. It was time the Committee had some peace; and they intended to have some. They had been a target long enough for everyone to shoot at; and it was quite time people tried to put a bullet somewhere else.

Alderman Sir Joseph Bright said he could not but express disappointment that the report of the Investigation Committee had not been presented to the Council that day or before. He thought the remnant of the Gas Committee—nine out of twelve—were placed in a very unfortunate and undignified position; and the resolution of Dr. Brown Sim would add to the indignity. Personally, he should be prepared to accept the resolution, if the appointment was to be made by the Gas and the Investigation Committees; but he was not under the impression that the resolution passed when the Investigation Committee was appointed was intended to confer on the Committee the appointment of every servant of the Gas Department. If that was so, what was left for the Gas Committee to do—if they had not even the discretion of appointing one who occupied a not very responsible position? It appeared there was a vacancy to be filled up; and it would be undignified if the Council went over the Gas Committee and placed the appointments entirely in the hands of the Investigation Committee.

The next speaker—Sir John Turney—regretted the most unfortunate discussion, and said he was extremely sorry Mr. Ashworth had taken up the position he had done. As for the remarks of Sir Joseph Bright, he could not understand them at all. A Special Committee had been appointed to look into the unfortunate business of the gas undertaking—it was none of their seeking—and a most painful work it had been, in many circumstances, to undertake. The Committee ought not to be found fault with because they had not rushed their report. They had been appointed but three months. A great many meetings had been held; and considerable time at the meetings had been devoted to the work. Again, it should be borne in mind that nearly one month of the three had been taken up with the holidays of members and officials; so that it was impossible for the Committee to proceed very rapidly. The Special Committee had no desire to hamper the Gas Committee, or what was called the remnant of that Committee, but rather they wished to do all possible to make their work easy. He, however, thought it was distinctly understood that no important appointment should be made in the undertaking until their report had been submitted to the Council. The remark that it was not intended that the Council should delegate to the Special Committee the appointment of every workman of the gas undertaking, surely did not require any answer; but the man they wished to appoint was not an ordinary workman. No common man could take charge of Eastcroft; and there was the vacancy at Giltbrook in addition. This vacancy occurred before the Committee were appointed; and it was not filled for the reason that they were told it was not then necessary. He begged of the Council to allow the matter to stand over for, at any rate, a short time longer. They had got through the personal side of the unfortunate business; and very soon now they would deal with the practical side. The Council would not help them to do their difficult work by discussing the question in the spirit adopted that day. There had been serious blunders; and their object was to stop them, and recommend something to put the undertaking on a basis which would prevent the discreditable work that had been going on. In reply to a question, Sir John said that the Special Committee hoped to be in a position to "say something" early in October.

Several other members having spoken, Mr. Ashworth said he thought the remark that the Gas Committee had blundered was very unfair indeed. It was all very well making these statements; but until the evidence was forthcoming, they did not know where they had blundered. Seeing that they had no chance of defending themselves, such assertions were very unfair. He should like to have some of their accusers in their position, and see where they would be.

At this point, the Town Clerk suggested that, as the Council had appointed two bodies to do the same duty, the easiest way out of the difficulty would be to ask both to make the appointment.

After some further remarks, Dr. Brown Sim's motion was put to the meeting, when it was carried without a dissentient, though one or two members abstained from voting.

BRADFORD COAL CONTRACTS.

A lengthy discussion took place in the Bradford City Council last Tuesday, when Mr. J. Stringer—in the absence of the Chairman, Alderman Hind—moved the adoption of the minutes of the Gas Committee, which contained a resolution accepting the tenders of various firms for the supply of gas coal and cannel. The quantity involved was 134,000 tons, and the average price 8s. 11½d. per ton.

The first point raised was with regard to the "fair contracts clause;" Alderman Hayhurst moving that one of the tenders should be referred back, because the firm had declined to sign the clause. He pointed out that all the other contractors for coal had signed it. Mr. Stringer asked whether the clause bore upon purchases made, to which the Town Clerk replied that it referred primarily to works, and this, he understood, was why some of the coalowners did not object to signing the clause—they thought it did not apply to them. Mr. Stringer admitted that the firm mentioned had erased the fair contracts clause; but he reminded the Council that up to now they had always exempted coal contracts from its operation. The clause was treated as a joke by colliery proprietors, who said it was not applicable to them. The tender was, however, referred back by 39 votes to 15.

A further amendment was then moved by Mr. Glyde, referring back the whole of the minute relating to the acceptance of tenders for the supply of coal. He said he did this as a protest against the exclusion of Bradford firms from the benefit of the contracts. Out of the 134,000 tons of coal required, only 4000 tons were going to a Bradford firm. Three other Bradford firms had tendered who last year secured contracts—one for 5000 tons, another for 10,000 tons, and a third for 20,000 tons, making 35,000 tons in all. The fact that these firms had not received a contract this year would mean a loss to the city of nearly £17,000; and a loss in wages, averaging the wages for the whole of the men employed at 6s. per ton, of over £11,000. The contracts found work for 120 miners, besides a number of boys, a number of men at the pit-top, and twenty men who were employed daily in carting the coal from the colliery to the gas-works. Outside firms supplying the same kind of coal had secured contracts for 56,000 tons. He thought the Gas Committee ought to have some consideration for local firms, to whom the loss of this business would be a serious matter. On good authority, he had heard that one pit would have to be shut down; and at another the men would be put on three days a week.

The amendment having been seconded, Mr. Smith remarked that this was as good a case of "chickens coming home to roost" as any he had known in his whole experience. Had their prices been within the margin, the four colliery firms in Bradford should have been able to secure contracts amounting to 50,000 tons; but they were out in price from 2d. to 5d. a ton. The great bulk of the coal from the local pits had to be carried 4 miles by road in order to get it to the gas-works; and it could not possibly be carted at less than 1s. 7d. per ton. Outside colliery proprietors, sending in coal by rail, could actually deliver at from 1s. 1d. to 1s. 6d. per ton. The local colliery proprietors worked under great difficulties to begin with, because they had to deal with thin beds of coal, for the getting of which a higher price had to be paid; but it would be within the memory of the Council that a resolution was passed some time ago forbidding any driver to take charge of two carts. The result of this resolution had been an increase in the cost of carriage of coal brought to Bradford from collieries at Tong, Dudley Hill, and Low Moor of no less than 6½d. a ton. The one-man-one-cart bye-law had proved a bigger failure than ever it was expected to be. In the case of these collieries, he calculated that it would occasion a loss of £12,500 in wages to colliers and £625 in rates to the Corporation.

Mr. Glyde said that the agents of two of the collieries concerned had been to see him; and it was a singular fact that neither of them made any mention of the one-man-one-cart bye-law. One of them explained the increase of from 3d. to 5d. a ton in the tender submitted by his firm by saying that a demand for an advance of wages was expected from the men; and the other said the increase was due to the higher prices of oil, wire, and everything connected with the working of a colliery. But another firm had tendered at the same price as last year, though, according to Mr. Smith, they were paying 6d. a ton more for carriage. The real fact was that, owing to the use of larger waggons, carriage was costing less than it used to do. At the same time, he held that the local firms ought to receive more consideration at the hands of the Gas Committee, because if their men were thrown out of employment it would have a serious effect on the local labour market.

In reply to the discussion, Mr. Stringer said the Committee had acted on the strict commercial principle of buying in the cheapest market. They decided, before the tenders were opened, that none above last year's prices should be accepted; and singularly enough these local firms were the only ones who had increased their prices. As to the statement that 400 or 500 men would be thrown out of work, he scarcely thought this likely. It was something in the nature of bluffing. The firms in question had still to deliver some 13,000 tons of the coal for which they contracted last year.

The amendment was defeated; and the minutes were approved.

COUNTY COUNCIL AND METER TESTING.

The annual report of the Public Control Committee of the London County Council, issued on the 14th inst., contains the following reference with regard to gas-meter testing.

The Sales of Gas Act, 1859, requires gas-meters to be tested and stamped, and authorizes local authorities to appoint inspectors and provide and equip offices in which to carry on the work. The Council have four such offices—viz., at St. Ann's Street, Westminster; Rosebery Avenue, Clerkenwell; White Lion Street, Spitalfields; and Avonmouth Street, Newington. The staff engaged at these offices consists of eight inspectors, and 47 assistants, clerks, and labourers. During the past year, 220,146 meters were tested at the four offices, and fees to the amount of £6662 1s. were received in respect of such testing. The following figures show the growth of the work since the year 1864: Year 1864, number of meters tested 31,186; amount of fees received £1026; 1868, 55,576 and £1862; 1878, 83,447 and £2930; 1883, 73,080 and £2670; 1898, 204,216 and £6468; 1899, 208,830 and £6620; 1900, 211,392 and £6724; 1901, 186,618 and £6071; 1902, 181,250 and £5840; 1903, 186,198 and £5842; 1904, 198,604 and £6072; 1905, 229,145 and £6993; 1906, 220,146 and £6662. The statutory fees for testing meters range from 6d. upwards, according to the size of the meter; and double fees are charged for meters tested *in situ*. The introduction of the penny-in-the-slot prepayment meter is to a large extent accountable for the great rise in the number tested since the year 1888. Of the 220,146 meters tested in 1906, 215,392 were dry meters, and 4754 wet. Of the total received, 193,715 were stamped, and 26,431 were rejected. The Sales of Gas Act, while making provision for testing the soundness and correctness of the measuring apparatus of a meter, makes no provision for testing the mechanism recording the quantity of gas consumed. The Council's inspectors are instructed to do all they can to detect inaccuracies in indices; but it is only practicable to examine, and even then imperfectly, the indices of less than one-third of the total number of meters submitted for examination. During the past year, eighteen incorrect indices were discovered; the amount of error in most cases being very large. The Board of Trade have not up to the present taken any active steps to secure an amendment of the law; but on a question being asked in the House of Commons early in the present session, the President said he would give the matter his attention.

HASTINGS AND ST. LEONARDS GAS COMPANY.

The New Works at Glyne Gap.

The Half-Yearly Meeting of the Hastings and St. Leonards Gas Company was held last Wednesday week, at the new Glyne Gap works—Dr. G. G. GRAY, J.P., presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, remarked that the Board thought the works had reached a sufficient stage of completion, and were of interest enough to justify them in asking the stockholders to inspect them. They must not expect to see completed works. They did not any of them hope ever to see the works finished; and probably their children and children's children would not see them completed. The works had been designed in three sections; and the first was the only one they had aimed at completing. This would take the place of the old works in the town, and would be competent to carry out the manufacture hitherto done there, and had sufficient accommodation for any increase they could anticipate for a reasonable time. The other sections offered an opportunity for a very considerable increase in the future. The maximum consumption, for instance, was something over 2 million cubic feet a day. In the first section, they would have (with accessories) sufficient for the making of 4 million feet a day; and when the three sections were completed, they would have sufficient accommodation for 8 million feet. Roughly, therefore, when the town got to something like 300,000 inhabitants, they might look for the completion of the works. All the money which had been spent had been expended as the means to the end of supplying the demand for gas in the town to the satisfaction of the consumers and the best advantage of the stockholders. Nothing had been expended on extravagance. Every new invention had been availed of, so far as it could be to advantage; and they had thoroughly up-to-date works. A comparison with last year's trading showed that there had been an increase in the amount of gas sold of something rather more than 1½ million feet. He generally gave them that in £ *s. d.*, in order to convey to them a better idea; but he did not do so this time because it would be misleading. There had not been an increase, but a falling off in the receipts for gas, because of the reduction in price of 1½d. per 1000 cubic feet. But nearly the whole of the falling off had been recouped by the saving of the duty on coal; and if they added to this the saving in manufacture due to the improved methods, the sum was considerably in excess of the deficit. There had been an increase in the receipts for meters and stoves of £310, and for residuals of £958 (make up of coke £529, breeze £66, tar £73, and ammoniacal liquor £290). This was the first time for a good many years that there had been an increase in the residuals. The net result was a growth in the receipts of £51. Under the existing circumstances, and especially the reduction of 1½d. per 1000 feet, he thought they were justified in saying the small increase was a satisfactory one. Turning to the expenditure side, there had been a decrease in the cost of manufacture of £692, which was due to the saving effected in the coal dues of £940, less the extra £248 that they had had to pay for the coal and oil. There had been a decrease of wages of £537, a decrease in rates, taxes, and insurance of £115, but an increase in repairs on the works of £681. As they had to maintain the gas supply, it was absolutely impossible to remove the works from Hastings to Glyne; and it was necessary to instal new plant before they could remove that at Hastings. But they had utilized, and were utilizing, the whole of the Hastings plant as far as possible, and were having it repaired, altered, and brought up-to-date. Repairs to mains showed £311—an increase due largely to the trams; repairs to meters and stoves had increased; and so had the sick fund (£74). It was thought that the removal was a fitting occasion to pension off certain employees, who were really past work, and consequently the sick fund had risen; but there was a great saving in wages. The net result was a satisfactory decrease in the expenses of £27; and with the £51 increase in the receipts, the net increase on the profit and loss was £78. It had been his pleasure to move more brilliant balance-sheets; but he did not think he had ever moved a more financially sound, and more satisfactory, report. He read a letter from Mr. A. W. Oke, who said that Southampton was extending Mr. Botley's process through the whole district. The Chairman reminded his hearers of the trouble they experienced in former years through naphthalene in the services, and how, soon after Mr. Botley came to them, he invented a process which got rid of it. Now came the testimony of Southampton.

Alderman IDENDEN seconded, and expressed his satisfaction at the efforts of the Directors. Considering the great work which had had to be borne, it was a cause for thankfulness that the shareholders had seen the works transplanted, while they were going to receive their usual dividend. On the top of this was £78 more profit. The dividend had been earned under very great competition.

The report was adopted unanimously.

The CHAIRMAN proposed a motion—"To authorize the Directors to issue, at such times and in such manner as they may deem desirable, such portion of the capital authorized by the Company's Act of 1899 as will realize £50,000, together with the amount of debenture stock authorized by that Act upon the issue of such capital." They desired power to issue fresh capital should it be necessary from time to time. Their capital was overdrawn to the sum of £40,000; but the amount they paid to the bank was very small—much less than the dividend on £40,000 would be.

This was agreed to; and thereafter the proprietors were escorted over the works.

Cost of the Rochdale Water-Gas Plant.—The Gas and Electricity Committee have passed accounts amounting to £4975 in connection with the installation of water-gas plant at the gas-works, the inauguration of which was recorded in the "JOURNAL" for July 10 (p. 122). These constitute the final payments. The total cost of the installation has been £9029, which is £105 below the estimate; the Committee regard this as a satisfactory result. It is reported that the plant is working well.

OTTOMAN GAS COMPANY, LIMITED.

The Payment of Income-Tax on Preference Shares.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Colonel JAMES LE GEYT DANIELL in the chair.

The SECRETARY (Mr. T. Guyatt) read the notice convening the meeting, and the certificate of the Auditors; and the report of the Directors (as noticed in the "JOURNAL" for the 4th inst., p. 653) was taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he regretted exceedingly the circumstances under which he was absent from the last meeting; but they all felt that the business could not have been in better and more able hands than those of his gallant friend Colonel Stephenson R. Clarke. It was with much pleasure that the Directors met the shareholders on the present occasion, with such satisfactory accounts as they had to place before them; but really there was very little for him to say, as the figures so clearly expressed the operations of the Company during the six months to June 30. The quantity of coal carbonized was 5706 tons, as against 4996 tons in the corresponding period of the previous year; while the total make of gas was 57,447,000 cubic feet, compared with 51,471,000 feet. As would be seen from the accounts, the cost of the coal was £5825, as compared with £4845; but no doubt the shareholders would be prepared for this, in view of the increased quantity carbonized. On the other side they would notice—he trusted with satisfaction—that the gas-rental amounted to £13,260, which was an increase of £1385. This increase had resulted almost entirely from the private consumers, which was a gratifying point. The rental from the public lighting remained practically the same. The bye-products realized £3292, as against £2872. The revenue the Company derived from fittings, meter-rents, &c., was £1435 on the present occasion, compared with £1222 last year. All this increase had been secured with a slight increase only in the Smyrna salaries and expenses. Depreciation, renewals, and repairs showed a considerable increase; but all this was laid out in maintaining the works. He was quite sure the item was not likely to be criticized by the shareholders, when they knew that the Directors' intention was to keep everything up to the highest state of efficiency. The balance-sheet, he thought, called for no remarks. The report, they would have noticed, announced a little alteration with regard to the preference shares, the dividend on which this time was being paid less income-tax. The attention of the Directors was called to a decision of the House of Lords in the case of the *Ashton Gas Company v. Attorney-General and Corporation of Ashton-under-Lyne;* and although the case was not on all-fours with their own Company, the decision affected them and all other companies having preference shares. Therefore the Directors consulted their legal advisers, and were told that, after the decision alluded to, they could not pay income-tax on the preference shares. The contract with these shareholders being for 7 per cent. at the most, anything handed over in excess of that would be improperly paid. The Directors were obliged, though with much reluctance, to do as they were advised; and so those who held preference shares would suffer to the extent of whatever income-tax the Government might impose. It was a great pleasure to the Board to have present that day their Engineer, Mr. John Gandon. He had come over here on leave, which was thoroughly well deserved, and also to discuss some very important points with the Board, which would no doubt tend to the future good of the Company. He quite hoped that before the meeting closed Mr. Gandon might be able to tell them something about the improvements at Smyrna, which he (the Chairman) had referred to on more than one occasion, and the advantages of which had fulfilled—and if possible more than fulfilled—all their expectations.

Colonel STEPHENSON R. CLARKE seconded the motion; and it was at once carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. H. W. ANDREWS, a dividend for the half year was declared at the rate of 7 per cent. per annum, less income-tax, on the preference shares, and of 7 per cent. per annum, tax free, on the ordinary shares.

The CHAIRMAN next proposed a vote of thanks to the Engineer, the Secretary, and the staff generally. He could only repeat what had been said on previous occasions, that they owed a very great deal to the management on the other side, and that they had there a man on whom the Directors relied with the utmost confidence.

Mr. A. M. PADDON, in seconding, said they all appreciated how very exceptionally they were dependent, in this Company, on officers who were situated at so great a distance away.

Mr. GANDON, in acknowledging the vote, said the Chairman had asked him to make a few remarks; but he thought he had really left him nothing to say. They had been very fortunate in Smyrna in having had some most extraordinary increases in business. Asia Minor, as they knew, was a rich but very undeveloped country. But he really thought it was now beginning to go ahead; and the large increases they had been having would he hoped (and believed) continue. He thanked the shareholders very much for their kind vote, and assured them that it would be his endeavour to take every possible advantage of business that might be offered.

The SECRETARY also briefly returned thanks.

Mr. A. W. OKE proposed, and Mr. W. H. DAUN seconded, a vote of thanks to the Directors; and with the CHAIRMAN'S acknowledgment, the proceedings terminated.

Gas Suffocation Case at Leicester.—On Tuesday, an inquest was held at Leicester on the body of Mrs. Thomas Windley, wife of an Alderman and ex-Mayor of the borough. The deceased lady, who had suffered from dropsy and weak heart, retired to rest on Sunday night, and the next morning was found dead in the lavatory, having been suffocated by gas. Nothing was heard of her during the night; Alderman Windley being away from home. The Jury returned a verdict of "Death by suffocation."

MERTHYR CORPORATION AND THE GAS-WORKS.

Proposal to Purchase.

The Merthyr Corporation have been for some time considering the advisability of acquiring the undertakings of the Merthyr Gas Company and the Dowlais Gas Company; and at a recent meeting of the Parliamentary Committee, a report by Mr. W. A. Valon was considered. In this Mr. Valon stated that, in his opinion, the maximum number of years' purchase would be for the Merthyr Gas-Works thirty years, and for the Dowlais Gas-Works twenty-four; and that the Corporation, if they purchased, would not have to increase the price of gas in the Merthyr district above the present standard of 2s. 9d. per 1000 cubic feet, while he believed that the standard in Dowlais—now 3s. 6d.—would be ultimately reduced to the same price as Merthyr. Mr. Valon said that, so far as electric light was concerned, he had no fears on this score for the future. The Committee, however, resolved, by a majority of one, to recommend the Council not to purchase.

On the recommendation coming before a special meeting of the Council, Mr. Gray, in moving its adoption, said that at Barry, Pontypridd, and the Rhondda (at each of which places the Local Authority had purchased the gas undertaking), the prices were higher than were now charged at Merthyr. If the Corporation bought the works, they could not supply gas any cheaper than at present; and if they supplied the consumers at the same rate in the lower parts of the district, it would be a burden on the ratepayers in the upper part of the borough. An amendment was proposed by Mr. John Davies, that it be an instruction to the Town Clerk to take the necessary steps to promote a Bill in the next session of Parliament for the purchase of the Merthyr and Dowlais Gas-Works. This, he said, would enable ratepayers to express their opinion by ballot. Mr. Arthur Daniel said he was in favour of the broad principle of municipalization; but he did not think they would be justified in experimenting with £150,000 of the ratepayers' money for the purpose of saving £150 a year. He believed that the works would not prove a source of profit, but a loss. The Town Clerk said that the Bill would have to be deposited before the ballot could be taken, and that, while the preliminary expenses would be covered by £500, the cost of taking the Bill through Parliament might be £5000 or more.

The amendment in favour of the Bill was carried by 14 votes to 12.

COLWYN BAY GAS-WORKS EXTENSIONS.

The satisfactory position of the Colwyn Bay gas undertaking was shown last Tuesday, when Mr. M. K. North, on behalf of the Local Government Board, held an inquiry with reference to an application by the Urban District Council for sanction to borrow £17,000 for the extension of the works.

The Clerk (Mr. J. Amphlett) stated that the population of the district, which was 8689 at the last census, was now estimated to be 12,000. In the summer, this figure might be trebled. The assessable value was £67,843; and the total outstanding loans for sanitary purposes, including water supply and the electric light, were £89,851. The general district rate amounted to 5s. 6d., and the poor and education rate to 2s. 8d. The extensions now to be carried out included the construction of a siding to the works from the London and North-Western Railway. This was desired in order that coal might be taken direct into the works from the railway, instead of having, as at present, to be carted a distance of 2 miles from the goods station. Another important advantage would be that the residuals, which had now to be sent from the works to the station by road, would go direct to the railway. In addition to the siding, there was to be provided a coal-store, with a capacity of 1000 tons, and a coal breaker, elevator, and conveyor. It was also proposed shortly to increase the dimensions of the governor-house, to add to the purification plant, and to lay down a new weighbridge.

Details regarding what was contemplated were furnished by the Engineer and Manager (Mr. J. W. C. Pennington), who, in addition, gave some statistics as to the growth of the undertaking, which was taken over by the Council in 1902. In the six years ended March 31 last, the make of gas increased by 20 million cubic feet per annum, and the length of mains laid by 10¼ miles.

It was pointed out that the Council would bear the entire cost of the railway siding; but the Railway Company in return agreed not to charge the Council any extra rate. The rates to Colwyn Bay station would be charged; and the waggons would be delivered into the siding 2 miles farther. At the same time, of course, the Company would have the advantage of the siding-space at Colwyn Bay, which would be vacated.

There was no opposition to the application.

ROCHDALE'S MUNICIPAL JUBILEE.

Progress of the Gas Undertaking.

Rochdale has been celebrating its Municipal Jubilee; fifty years having elapsed since the incorporation of the town. Naturally, full advantage has been taken of so fitting an opportunity to mark the progress that has been made; and in no direction is the result more satisfactory than when consideration is given to the affairs of the local gas undertaking.

The gas undertaking (the following particulars as to which are given by the "Rochdale Observer") was acquired more than sixty years ago—to be exact, in 1844. The price of gas at that date was 7s. per 1000 cubic feet; but the Commissioners at once reduced it to 6s., and nine years later the charge was 4s. At the same time there was great extension of the mains, so as to bring the light as soon as possible into every part of the town. The result of the new policy was that within fourteen years the number of consumers rose from about 800 to 8000; the price of gas was reduced by about 40 per cent.—from 7s. to 4s. per 1000 feet; the streets were much better lighted; and many thousand pounds were taken from the profits of the department to carry out important street improvements in the centre of the town. The following table shows the advance that has been made since 1846, when there had been one complete year of municipal control:—

	1846.		1905-6.
Capital	£27,700	..	£225,256
Gas made	27,919,000 c.f.	..	554,815,000 c.f.
Gas sold	£5,683	..	£56,421
Average price	5/4¼ 1000 c.f.	..	2/0¼
Consumers	904	..	*28,911
Coal cost	£2,181	..	£28,285
Interest	£1,268	..	£7,542
Rates and taxes	£118	..	£4,763

* Number of meters.

In addition to the large reduction that has taken place in the price of gas, the rates have been continuously relieved by amounts varying from £478 in the first complete year under the Commissioners to £17,693 in 1905-6. For many years the works were being almost continually extended. The Corporation accounts show that between 1853 and 1878 there were only seven years in which no addition was made to the capital account. Then came fourteen years without further loans. Between 1893 and 1898, over £60,000 was borrowed; and since then the capital account has not been increased, though considerable sums have been spent on the works out of the reserve fund. Last year some £10,000 was spent on a carburetted water-gas plant. Differential charges within and outside the borough were commenced in 1857-8, when customers beyond the municipal boundaries were charged 1s. per 1000 cubic feet extra. In 1864-5, this was reduced to 6d.; and it remained at that amount, with occasional variations, for many years. The difference is now 3d. per 1000 feet.

The manufacture of residual products has been a notable development of the past twenty or thirty years. In the early statistical records of the department, there is no mention of these bye-products. In 1860-1, the total amount received from tar, ammoniacal liquor, and coke was £1230; while ten years later, it had risen to £3314. Twelve months ago, the receipts from residual products were £23,886.

It is during the managership of Mr. T. B. Ball, and with Mr. T. Stenhouse as Chemist, that this remarkable growth has taken place.

THE PRICE OF GAS IN NEW YORK.

A Law Suit Goes against the Consolidated Company.

According to American papers recently to hand, a decision adverse to the Consolidated Gas Company of New York was given last month in a Court of First Instance, and which, if not reversed in the Higher Court, may work great injustice to stockholders in the concern.

Application was made on behalf of a consumer of the Company's gas for a peremptory writ of mandamus to compel them to supply him with gas "at the statutory rate of 80 c. per 1000 cubic feet"—the Company threatening to discontinue the service to the petitioner unless he pays at the rate of $1 per 1000 feet. The Company contended that the lower price named was insufficient to afford the stockholders a reasonable income upon their property; and that, therefore, the statute cited by the petitioner was "unconstitutional and void, in that it deprives them of their property without compensation and due process of law." The respondents claim to have been "duly organized in 1884 by the consolidation of various Gas Companies, pursuant to the statute which permitted them to issue capital stock up to the amount of the fair aggregate value of the property, franchises, and rights of the several Companies thus consolidated, and that the capital stock which was then issued—amounting to $37,775,000—did not exceed such aggregate value, and that the permission to issue such amount of stock constituted a contract between the respondent Company and the State of New York, permitting the respondent Company to maintain such amount of stock outstanding 'and to earn a reasonable return thereon.'" The answer then went on to allege that, in order to enable the Company to carry on their business, it was necessary for them to charge a price for gas sufficient to cover the cost of manufacturing and distributing gas and a reasonable allowance charged to offset depreciation in the value of the plant, and to meet the cost of such changes in machinery as may be necessary; also to make good the loss occasioned by necessary abandonment of portions of the plants and in addition thereto a reasonable profit on the fair value of the property owned and used in the business. It then proceeded to allege that if compelled to supply gas for the price of 80 c. per 1000 cubic feet, as fixed by statute, it will be unable to earn the amount referred to, and the obligation of the contract with the State of New York will be "impaired."

Dealing with the defence thus set up, the Judge (Justice Giegerich) construed it, taken as a whole, that the Company do not allege that the 80 c. rate permitted by the statute will not enable them to earn enough to cover all the amounts referred to in the second paragraph—that is, the cost of manufacture and distribution, a reasonable allowance to offset depreciation, the cost of changes in machinery, and to make good the loss arising from abandonment of portions of the plant (and a reasonable profit) used by it in its business; but that, on the fair value of the property owned, such rate is not enough to cover the amount just enumerated, together with a return on the original capitalization which it apparently claims the right to pay in perpetuity under contract with the State, although the value of the property then in existence, and even of the property and the franchises and rights all combined, may have depreciated very materially since the year 1884. By alleging the contract-right, and basing allegations of fact in part upon such alleged right, the respondents, in his view of the law, failed to prevent any question of fact. He therefore held against the contention that the respondents are entitled to charge such a rate, or to pay in perpetuity a return upon an original capitalization. Neither did he think there was any issue presented as to the sufficiency of the tender of payment made by the petitioner. His conclusion on the points so far discussed rendered it unnecessary to consider the other arguments advanced in support of the petition.

GAS v. ELECTRICITY AT ALDERSHOT.

In last Friday's "Aldershot News," Mr. R. W. Edwards, the Secretary and General Manager of the Aldershot Gas and Water Company, writes again on the subject of gas and electricity in the town, the previous correspondence in regard to which has already been noticed in the "JOURNAL" (*ante*, pp. 457, 712).

After recapitulating the facts already put forward by him, he says that the Council run their own electric works, and fix the charges for electric lamps, which, on the existing working, cannot be reconciled to the expense of generating the current; whereas, with the cost of gas, the charge is on a given rate per 1000 cubic feet. The net cost of both lighting factors is the basis of the comparative value for lighting; as beyond this expense it is a question of economy or otherwise in regulating the attendance and upkeep. Gas will, on the present charge to the Council, yield by incandescent burners 1000-candle power for less than 1½d.—or, with higher power lamps, for about 1d. Electricity, on the present cost to the Council, yields by arcs and incandescents, 1000-candle power for 9·16d. Therefore, to compete with gas for street lighting purposes, electricity must be sold at as little as ¾d. per Board of Trade unit.

On the subject of the Bermondsey clause, which he urges ought to be applied to Aldershot, Mr. Edwards says: "As in the case of Aldershot, I submit the balance sheet of Bermondsey for the year ended March, 1906. *Dr.*—Expenditure, including works, &c., and loan and special charges, £11,072; surplus, £3660.—£14,732. *Cr.*—Revenue, all sources, 1,564,462 units sold, £14,732. Here we find a net profit of £3660, against Aldershot's loss of £145 for the same year. The cost per unit sold was 1·69d., against Aldershot's 4·58d. The average revenue from street lighting was 2·21d., exclusive of maintenance and repairs. From private consumers, the average revenue was 2·22d.; practically the same rate as that from street lighting. In comparison, Aldershot revenue works out: Private, 4·69d.; public lighting, 2·28d.—a difference over street lighting of more than 100 per cent. You will therefore observe how obviously differently the regulating of the charges is arranged at Bermondsey, where revenue meets all expenses, and the charges are equally arranged to public and private consumers. Aldershot's undertaking should be worked on this basis; and then the consumers of electricity can participate in its prosperity by taking equal reduction in the rate for energy, and the public bear the proper expense of street lighting. Then will the question be thoroughly apparent. Consumers will, with ratepayers generally, watch their respective interests; and if the rates are, as in Bermondsey and elsewhere, identical in rate and ratio to both classes of consumers, the burden, or the benefit, arising from this municipal undertaking will be properly distributed, whereas at present any deficit falls on the ratepayers generally, to support that which many of them do not enjoy."

NEW WATER-WORKS FOR LOUGHBOROUGH.

Completion of the Blackbrook Scheme.

The laying of the last stone in connection with the Blackbrook water scheme of the Loughborough Corporation took place last Wednesday; a large number of people being present at the ceremony. The stone was laid by Alderman Joseph Griggs, who was first Mayor of the borough, and has been one of its greatest benefactors.

The reservoir and works have taken six years to construct, and have entailed an expenditure of over £100,000. Until the present scheme was launched, the watershed for Loughborough and the adjacent hamlets of Woodthorpe and Knighthorpe was comprised within what is known as the Woodbrook district; the reservoir, capable of storing some 30 million gallons, being situated at Nanpantan, 2 miles outside the borough. These works date from the year 1870. But the continued growth of the population, together with the expansion of its industries, made further provision necessary; and in 1886 the then Local Board obtained a further Act—a competing Bill of the Leicester Corporation not being successful. Under the new powers, the waters of the Blackbrook, 6 miles distant, were secured; while at the same time the supply area was enlarged so as to include a portion of the township of Shepshed. Under this scheme, two intakes were constructed to the Nanpantan reservoir; but the relief was only temporary, and in 1897 further powers were sought to enable the Corporation to build an impounding reservoir at Blackbrook. Land amounting to 113 acres was acquired; and the present reservoir, with a capacity of 500 million gallons, has been constructed. The Blackbrook watercourse runs in a channel through a natural valley; and the work has consisted of placing a dam across one end of the valley. The work of building the dam, which is 525 feet long and 65 feet thick at the base, and carries a roadway 9 feet wide on six overflow arches, was originally let by tender to a Lancashire firm, with Messrs. George and F. W. Hodson as Consulting Engineers, and Mr. C. E. Robinson as Resident Engineer; but ultimately the Contractors expressed dissatisfaction with the foundations—the outcome of the dispute being that in 1904 the Corporation terminated the contract and took over the works. The task has now been finished to the entire satisfaction of all concerned. The down-stream face-wall is composed of blue bricks, so bonded that there is not a single continuous horizontal joint; and the backing is of specially prepared concrete. A tail pond acts as a water-cushion, preventing all scouring action on the toe of the dam during the heaviest flood discharges; and a valve-tower and valve-house, with apparatus, is arranged so that the water may be discharged out of the reservoir at various heights.

In opening Wednesday's proceedings, the Mayor (Alderman William Hanford) said the town of Loughborough was now felt to be secure from any famine. For many years to come, they could not possibly have any fear of a scarcity of water. The Chairman of the Water Committee (Mr. James Cartwright) then, on behalf of the Council, presented Alderman Griggs with a wrought silver model of the dam in the form of a spirit level, and doing so supplied details relative to the development of the water scheme. He added that all along the Corporation had been most fortunate. They were fortunate in securing eighteen years ago the Blackbrook rights; and Nature, too, had been kind to them, so that the reservoir had been constructed at a minimum of cost. After Alderman Griggs had performed the ceremony of laying the top stone, Mr. George Hodson, on behalf of the Engineers, presented him with a bound volume descriptive of the works. Subsequently there was presented to Mr. Cartwright a beautifully chased and suitably inscribed silver rose-bowl and candelabra, which had been subscribed for by members of the Water Committee and a few friends, to mark the immense amount of time he had willingly devoted to the undertaking.

A brief inspection of the works was followed by a luncheon, when the toast "Success to the Water Undertaking," was proposed by Mr. Maurice Levy, M.P. By their energy and enterprise the Engineers had, he said, built for them a magnificent property, of which the ratepayers must be exceedingly proud. There had always been a diversity of opinion as to the property that should be owned and controlled by public and municipal authorities; but he thought there was agreement that such undertakings as this, as well as all that concerned the health and sanitation of the towns and villages, should be so owned and controlled. The ultimate success of the undertaking would, of course, depend upon the inhabitants at large, and upon those who had the duty of managing the works. But success he was confident was assured, when they looked back and saw the difficulties that had been overcome. Mr. B. B. Barrow gave "The Engineers," observing that throughout both Mr. George Hodson and his son had enjoyed the fullest confidence of the Committee. He also paid a compliment to Mr. Robinson, who had had charge of the work, and to the men.

THE WATER SUPPLY OF NOTTINGHAM.

Rapidly Increasing Consumption.

Speaking recently at a luncheon following the opening of a new suspension bridge over the River Trent, Alderman J. Jelley, the Chairman of the Water Committee, made an important statement regarding the present water supply of Nottingham and the probable future requirements of the town.

Referring to the consumption, Alderman Jelley said that in the last week of July the Committee thought they had reached the maximum of supply, for the amount of water consumed in that week was no less than 66 million gallons. But since then even this record had been broken; and in one week 67 million gallons—the greatest quantity in the history of Nottingham—had been consumed. To meet this demand, the whole of the machinery was working at high pressure, and the wells were very considerably depleted. In 1880, when the Corporation took over the water supply from the private Company, the weekly consumption was only about 25 million gallons. A few years ago, they obtained the district of Boughton, in the Sherwood Forest, where to-day they were putting down machinery which would lift and send to Nottingham, a distance of 20 miles, a splendid supply of water. During the building of the permanent engines, they had been sending to the city over 24 million gallons per week, which would otherwise have run to waste; and but for this additional water, it would have been impossible to have kept up the city's supply during the last three or four years. When Leicester, Derby, and Sheffield were scrambling for the surplus waters of the Derwent, Nottingham—feeling that they were entitled to a share, seeing that it was part of the Trent water—sought, and after some difficulty obtained, a proportion which would bring the city about 14 million gallons per week. The work of constructing the great dams in the upper reaches of the Derwent had been going on for five years; and it would be quite another six years before any water could be supplied from this source. In the meantime, Nottingham was likely to have a rough time so far as its water supply was concerned, though he thought the Water Committee would bring forward a scheme to tide over this period. If the consumption went on increasing at the present rate for the next six years, it would mean that they would require an additional supply of no less than 30 million gallons per week. With an increase of 5 million gallons per week, the outlook for the six years was a serious one. Some time ago, they thought they would be able to tide over their difficulties until the Derwent water scheme was productive; but when they had demands on them of 67 million gallons in one week, it was obvious that they must be prepared to give a much bigger supply. He hoped the Committee would have sufficient strength to press forward some scheme, and that the Council would support them in whatever they might propose to ensure the city a permanent and efficient water supply.

PONTYPRIDD WATER SUPPLY.

A Serious Outlook.

The inhabitants of Pontypridd are face to face with a serious position regarding their water supply. By Act of Parliament, the Pontypridd Water-Works Company are obliged to supply the districts within their area with a pure and wholesome water, thoroughly and efficiently filtered at all times; and they are further required that the supply shall be constant, and not intermittent.

In consequence of complaints received, the Medical Officer of Health (Dr. Howard Davies) has been making investigations; and his report reveals a most unfortunate condition of affairs. He states that in a large part of the district the supply has been most unsatisfactory, owing to its scarcity and unwholesomeness. Throughout the greater part of the district it has been intermittent in character; and owing to its colour and the sediment it contains, householders decline to make

use of it for drinking and culinary purposes, and obtain water from small springs. As the result of a visit to the works, he had found the filtration of the water had not been carried out during the present summer, except for a brief period. The Company had now utilized all their available sources of supply; and a thousand new services had been laid on in twelve months. "At this progressive rate of increase in the demand," says the Medical Officer, "for new services from an absolutely limited supply, it is really a most serious matter for contemplation what the inhabitants of the districts supplied by this Company are likely to endure in the near future from the gradually diminishing supply at the disposal of the Company. The prospects of a water famine may soon be realized, with its attendant horrors, unless joint action is taken by the Local Authorities concerned, together with the County Council, to remedy without further delay the constant peril to the welfare of the districts and the inhabitants thereof." The fact that diarrhœa is so prevalent in the district is partially attributed to the scarcity of the water supply.

The Council decided to adopt the recommendations of the Health Committee, which were that the Council should seriously consider the question of approaching Parliament with a view to obtaining powers to supply water, and that they should engage the services of an expert to examine the water at the source and along the points of supply and to take analyses. It was also decided to send a copy of the report to the Pontypridd Water Company.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Paisley Town Council on Tuesday had before them the question of the legality of the practice of purchasing coke at the gas-works by Bailie Caldwell and Bailie Dougall. The opinion of the Lord Advocate for Scotland—Mr. T. Shaw, K.C.—had been taken upon the questions: (1) Does the purchase of coke by a member of a town council from the gas-works of such town council disqualify such town councillor from being or continuing a councillor in terms of section 13 of the Town Councils (Scotland) Act, 1900? (2) If Counsel should have difficulty in replying to the foregoing question without qualification, does the purchase of coke, under the circumstances set forth by the councillors named herein disqualify either or both of them under the said Act? (3) Should Counsel be of opinion that the councillors named are not disqualified in terms of said Act, are such purchases competent in view of the fiduciary character of their office as trustees for the public interest? The reply of the Lord Advocate was to the following effect: (1 and 2) The breadth of the prohibition of section 13 of the Town Councils (Scotland) Act, 1900, is sufficient answer to the first query, which is of an abstract character. It is undoubted that sub-section 5 subjects to disqualification a councillor who "has directly or indirectly by himself or his partner any share or interest in any contract or employment with, by, or on behalf of, the Council." The remainder of the sub-section provides specific exceptions; but apart from these, the language employed by the statute is of as sweeping a character as that which formed the subject of consideration in a variety of English decisions. In addition to those referred to in the memorial, I may mention the case of *Nutton and Wilson* (22, Q.B.D., p. 744); and in the language of Lord Esher "With regard to provisions of this kind, they are intended to prevent the members of local boards, which may have occasion to enter into contracts, from being exposed to temptation, or even to the semblance of temptation." This case had reference, not to a direct contract between the Board and its members, but to a sub-contract between the member and the contractor to the Board. The whole price of the work involved was only a few pounds; and the language of the Master of the Rolls when he said "I think it is only right to say that we do not intend to support any corrupt intention on the defendants' part," is language which may be taken as entirely applicable to the cases raised by the memorial. I find, however, that the case of Bailie Caldwell (on a somewhat large scale) and of Bailie Dougall (on a very small scale) are not cases of private consumers purchasing goods in ordinary open market. Were they of this character, there would still be a serious question to be determined. But they are truly the cases of middlemen who buy goods from the Corporation, under transactions covered by the operations of the Gas Committee, of which they themselves are members, and who transfer the goods to the actual consumer. Whether there was a resultant profit to the middlemen or not, I am of opinion that the principle of the situation is this—that the true duty of members of the Corporation was to bring the purchase into direct relation with the Corporation as vendors, and not to interpose by way of personal contract as above described. I am accordingly of opinion that, under the circumstances set forth in the memorial, the statutory disqualification has attached to both of the Councillors named. Question 3 is superseded.

After the Lord Advocate's opinion had been read, Bailie Caldwell said he considered that he had acted all along in a straightforward manner in his dealings with gas coke, and on the advice of Mr. Martin (the Town Clerk). But as Mr. Martin had since changed his opinion on the subject, and as his changed opinion had been confirmed by the Lord Advocate, he now felt it to be his duty to resign his office as a member of the Council. He did so with feelings of deep regret. Provost Eadie said that, before Bailie Caldwell left them, he desired to assure him of their regret at the severance of his connection with the Council, and of their high appreciation of his services as a member of the Corporation. The Council agreed to hold a special meeting to consider the position of Bailie Dougall.

I have referred to this subject with some fulness, because the decision will have effects reaching further than the Council Board in Paisley. When the subject was first brought under the notice of the Council, the Town Clerk gave his opinion in favour of the two members implicated, on the ground of information he had received as to the practice followed in Glasgow. On his looking into the matter for himself,

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Blackburn	1,250,000	Winnipeg, Man.	500,000	Malton	150,000
Windsor St. Works, Birmingham	2,000,000	Colchester (Second Contract)	300,000	Smethwick	500,000
Saltley Works, Birmingham	2,000,000	York	750,000	Gravesend	300,000
Colchester	300,000	Rochester	500,000	Pernambuco, Brazil	125,000
Birkenhead	2,250,000	Kingston, Ont.	300,000	Duluth, (Second Contract)	300,000
Devizes	120,000	Crystal Palace District	2,000,000	Leicester (Second Contract)	1,000,000
Saltley, Birmingham (Second Contract)	2,000,000	Duluth, Minn.	300,000	Newport (Second Contract)	250,000
Windsor St., Birmingham (Second Contract)	2,000,000	Caterham	150,000	Brockville	250,000
Halifax	1,000,000	Leicester	2,000,000	Toronto (Third Contract)	750,000
Toronto	250,000	Enschede, Holland	150,000	Montreal, Ont. (Second Con.)	1,800,000
Ottawa	250,000	Buenos Ayres (River Plate Co.)	700,000	Toronto (Fourth Contract)	1,000,000
Lindsay (Remodelled)	125,000	Burnley	1,500,000	Hamilton, Ont.	400,000
Montreal	500,000	Kingston-on-Thames	1,750,000	Rochester (Third Contract)	1,600,000
Toronto (2nd Cont., Remodelled)	2,000,000	Accrington	500,000	Leeds (Second Contract)	900,000
Belleville	250,000	Tonbridge	300,000	Buenos Ayres (Primitiva Co.)	1,200,000
Ottawa (Second Contract)	250,000	Stretford	500,000	Buenos Ayres (New Co.)	1,200,000
Brantford (Remodelled)	200,000	Oldbury	300,000	Christchurch, N.Z.	300,000
St. Catherines (Remodelled)	250,000	Todmorden	500,000	Rochdale	1,600,000
Kingston, Pa.	125,000	Saltley, Birmingham (Third Contract)	2,000,000	St. John's, Newfoundland	250,000
Peterborough, Ont.	250,000	York (Second Contract)	750,000	Brantford (Second Contract)	400,000
Wilkesbarre, Pa.	750,000	Rochester (Second Contract)	500,000	Smethwick (Second Contract)	500,000
St. Catherines (Second Cont.)	250,000	Newport (Mon.)	250,000	Pontypridd	250,000
Buffalo, N.Y.	2,000,000	Tokio, Japan	1,000,000	Montreal (Third Contract)	1,800,000
		Newcastle-on-Tyne	1,800,000	Guelph, Ont.	50,000
		Leeds	1,800,000	Buenos Ayres (River Plate Co.) Second Contract	750,000
				Belgrano (River Plate Co.)	500,000

And, in addition, COAL GAS PLANTS at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND CALGARY, and WINNIPEG.

however, the Town Clerk was satisfied that the practice was a wrong one; and when he communicated this view to the Town Council, it was then resolved to procure the opinion of the Lord Advocate. They have now got his opinion; and the only possible course has been followed—that of the resignation of the gentleman whose transactions had been called in question. To how many other places will the new reading of the Act of 1900 apply? It will be observed that it is a recent Act. Its author was the late Mr. A. Asher, K.C., who was moved to have it placed on the Statute-Book by various municipal bodies, with the intention of removing certain disabilities and removing certain difficulties that had been experienced in working the numerous statutes which governed procedure in the Scottish burghs. That it has done so, there is no room for doubt; but, like other Acts of Parliament, its application is sometimes not what was intended.

The Directors of the Bothwell and Uddingston Gas Company have decided to reduce the price of gas, as from the next survey, from 2s. 11d. to 2s. 6d. for 1000 cubic feet.

At the last meeting of the Fraserburgh Town Council, Provost Finlayson reported that the Town Clerk had prepared an exhaustive report upon the proposal to acquire the gas undertaking. On the suggestion of the Provost, it was agreed to circulate the report among the members of the Town Council before considering it.

The example of the Corporation of Edinburgh in the matter of public lighting is likely to have great effect among the burghs of Scotland. I see it is intimated already that the Lighting Committee of the Falkirk Town Council have resolved to have a series of tests made with inverted incandescent gas-burners; the object being to ascertain if a better light can be obtained than is got from the existing incandescent burners, and also whether less gas will be consumed.

In the village of Strichen, in Aberdeenshire, there is a Gas Company, a small concern to be sure, but one which is just as zealous in the service of the public as are the very largest undertakings. The Company have been served in the capacity of manager and handyman for the long space of twenty-nine years by Alexander Sim. During his term of office, it is stated, the consumption of gas has greatly increased, and the price has been considerably reduced. Mr. Sim has now, on account of advancing years, retired from office; and the Directors have appointed Mr. J. Jones, of Keith, late of Fochabers, to succeed him.

Coal and Fire-Clay in North Antrim.—It is reported that the preliminary arrangements have now been completed for the working of the North Antrim coal-beds discovered some time age at Ballycastle. A Company has been formed, under the title of the Belfast Coal and Iron Company, Limited, with a capital of £500,000. This money has already been found, so there will be no issue to the public. The Company have acquired all mining and mineral interests in the entire district, but have no connection with similar undertakings in any part of the country. In addition to the coal found, the prospectings have revealed the existence of large and rich deposits of fire-clay, the presence of which in Ireland has heretofore been unknown.

CURRENT SALES OF GAS PRODUCTS.

Week ending Sept. 15.

Tar products generally continue to be firm in the London district. The position of pitch is encouraging; 31s. 6d. net has been several times refused, and it is reported that 32s. has been paid for a large quantity for delivery all over the season. Crystal carbolic is quiet but firm at 5¾d. for 35° and 6d. for 39/40°. Benzol remains without change at 10¼d.-10½d. for 90's. 60° crude carbolic is still at from 1s. 9d. to 1s. 9¼d. net. The demand for ordinary London creosote continues, and in fact some large orders are having to be declined. Best makes of anthracene remain at 1¾d. for 40-45 per cent. A good business has been done during the week in cresylic acid. A little more interest is being shown in sulphate of ammonia. The price for prompt is from £12 to £12 2s. 6d. on Beckton terms.

Sulphate of Ammonia. LIVERPOOL, *Sept.* 15.

Notwithstanding increasing production, available supplies have found a ready sale, and to cover urgent orders extreme prices have in some cases been paid. The market closes with a firmer tone, and at a slight improvement upon last week's prices; the quotations being £11 17s. 6d. per ton f.o.b. Hull, and £12 to £12 1s. 3d. per ton f.o.b. Liverpool and Leith. A fair business has also been done for October-December delivery at £12 3s. 9d. up to £12 5s. per ton f.o.b., and for January-June at up to £12 10s. per ton, which is the closing price for this period.

Nitrate of Soda.

This article is very firm in all positions, and spot prices are 11s. 7½d. and 12s. per cwt. for 95 per cent. and refined qualities respectively.

Tar Products. LONDON, *Sept.* 15.

Markets have been firm during the past week, and prices well maintained. The strong tone which has lately prevailed in pitch has continued; but there has not been any further increase in prices. London manufacturers still maintain their quotation of 32s. to 32s. 6d., and 31s. 6d. has been realized. Some quantity was bought upon the east coast for delivery over the next six months at 30s.; but generally manufacturers are asking this price for prompt, and do not care to quote under 32s. for forward. On the west coast, business has been done at 29s. 6d. for prompt. One parcel which was offered at 30s. to March next was refused; but this was at an out of the way port. The Continental buyers are still holding off the market; but the South

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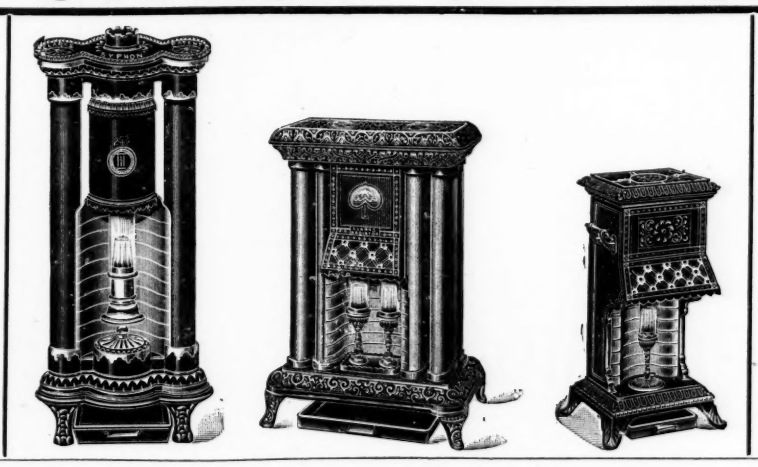

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Wales consumers are anxious to buy over the first few months of next year. Creosote remains firm. London manufacturers have practically none left for disposal this year; and for next year they do not seem inclined to quote, evidently believing in a continued demand from America. In the North, business has been done for a large quantity at 1⅝d. to the end of March; but most manufacturers ask 1¾d. The Midland makers quote this price for whatever quantity they have for disposal. Carbolic acid remains unchanged. Continental consumers are still willing to pay 1s. 9d. for prompt delivery, but do not care to buy forward at this price. Business was done on works in the North at 1s. 8⅝d. for prompt. Values of crystals are unchanged; and no sales of importance are reported. There is still a large demand for salts; and manufacturers are not inclined to sell except at high prices. Benzol remains very firm; and London manufacturers are evidently very well sold for prompt and do not feel inclined to do business forward except at good prices. It is reported that 90 per cent. has been sold in London at 10½d. f.o.b., while 10¾d. is asked for small quantities upon makers' works. 50-90 per cent. still remains very firm; and 11⅛d. to 1s. is being asked, according to quantity, port, and period of delivery. Solvent naphtha remains very firm indeed. Business has been done to the end of the year at 1s. 1¼d. at makers' works in the Midlands; while London manufacturers are still very short, and report having obtained very good prices for prompt delivery. On the east coast, 1s. 2d. is being asked for delivery to the end of the year; and even at this price makers will not book large quantities. High-flash naphthas are also in strong demand and fetching good prices. The position remains about the same in toluol. In the Midlands about 1s. 0½d. at makers' works appears the ruling price, and on the east coast 1s. 1½d., while in London 1s. 2d. could be readily realized for any small uantities there might be available.

The average values during the week were: Tar, 15s. 6d. to 19s. 6d. Pitch, London, 29s. 6d. to 30s. 6d.; east coast, 29s. to 29s. 6d.; west coast, 28s. to 29s. 6d. Benzol, 90 per cent., 10d. to 10½d.; 50-90 per cent., 11¼d. to 11⅜d. Toluol, 1s. 1½d. to 1s. 2d. Crude naphtha, 4½d.; solvent naphtha, 1s. 1d. to 1s. 3d.; heavy naphtha, 1s. to 1s. 2d. Creosote, London, 2d. to 2 1/16d.; North, 1½d. to 1¾d. Heavy oils, 2¼d. Carbolic acid, 60 per cent., 1s. 9d. to 1s. 9½d. Refined naphthalene, £4 10s. to £9 10s.; salts, 28s. to 30s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been quiet but steady during the past week; but there has not been a great deal of business. London manufacturers ask from £12 2s. 6d. to £12 5s.; but there are second-hand sellers at under this. In Hull, the market is quiet; and £11 17s. 6d. was accepted for a good make for September delivery. In Leith, makers are firm in their ideas, and report having realized £12 2s. 6d. for September delivery. In Liverpool, business is reported at £11 17s. 6d. to £11 18s. 9d., according to quality; but in most cases £12 is asked for September delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

This last week trade in coal has shown some improvement. The demand for house fuel is steadily increasing. Merchants and coal dealers are laying in stocks for distribution. Gas coal and cannel are going out in larger quantities. Steam coal and engine fuel command a steady sale. The miners are everywhere being urged to apply for an advance in wages, consequent upon the repeal of the coal-tax, which takes effect in November. The average prices, at the pits, show no alteration from our last published list. At a meeting of miners of the Pendleton district last Wednesday night, it was pointed out that at the end of the present year, the term for which the Miners' Conciliation Board was elected comes to an end. It was considered advisable to renew and prolong such a Board; but it should be differently constituted. It was suggested that the Board should have power, at the quarterly meetings, to consider and discuss the state of trade and all general conditions affecting employment, and the fixing of contracts and other selling prices of coal. It was also considered advisable for all existing Conciliation Boards to be got into line with one Board to regulate the wages of the three countries.

Northern Coal Trade.

There is a slightly better tone in the Northern coal trade; but quietness is still shown in some of the branches. This is due to the same feeling as recorded last week. Steam coals show the quietness most. Best Northumbrians are from about 10s. 3d. per ton f.o.b., second-class steams are about 9s. 9d., and steam smalls are from 6s. to 6s. 3d.; but some of the collieries, which are well placed with orders, ask higher prices. In the gas coal trade, there is now an appreciable increase in the home consumption, and good Durham gas coals are in full request, though the output of second-class coals seems to increase. Prices are from about 9s. 6d. to 10s. 10d. per ton f.o.b., according to quality. There is little or nothing to report as to additional contracts this week; but the quotations for forward delivery are now lower, being without the tax, which ends in a few more weeks. Coke is very firm; and gas coke is steady in spite of the increased production. For export, good gas coke is from 11s. to 12s. per ton f.o.b., with a tendency to improve with furnace coke.

Scotch Coal Trade.

Trade continues to look better; the demand keeping well up, though supplies are very plentiful. The prices quoted are: Main, 8s. 9d. to 9s. per ton f.o.b. Glasgow; ell, 8s. 9d. to 10s.; and splint, 9s. 6d. to 9s. 9d. The shipments for the week amounted to 281,870 tons—a decrease of 4828 tons upon the preceding week, but an increase of 26,946 tons upon the same week of last year. For the year to date, the total shipments have been 9,416,901 tons—an increase of 1,072,387 tons upon the corresponding period of 1905.

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Sept. 2, 93° in the Shade.

Sept. 11, 4° of Frost.

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Proposed Purchase of the Pontypool Gas and Water Company.

At the last meeting of the Abersychan Urban District Council, a report was presented of the conference of the Pontypool, Abersychan, and Panteg Councils, who had been deliberating on the question of water supply. The Joint Committee, having considered a report of Mr. Baldwin Latham on the water undertaking, presented the following recommendations: "(1) Having regard to the facts disclosed in the report of Mr. Baldwin Latham, and the failure on the part of the Pontypool Gas and Water Company to fulfil their statutory obligations, the Committee are of opinion that the time has arrived when the undertaking of the Gas and Water Company should be acquired by the three Councils. (2) In the event of the adoption of the above-mentioned by the Councils concerned, the Pontypool Gas and Water Company be asked whether they are prepared to sell their undertaking, and upon what terms." The recommendations were agreed to by the Council. An epidemic of typhoid recently broke out in the district, which the Medical Officer of Health at Panteg (Dr. Essex) ascribes solely to the water supply.

An Appreciation at Hastings.

The achievements of the Hastings Gas Company have moved the local "Evening Argus" to the utterance of a few well-deserved words of praise. Under the heading of "Topics of the Day," they remarked: "Some people are wondering what sort of a hash the Hastings Council, as a body, would have made of such an undertaking as that which the Gas Company are so successfully accomplishing. New works have been established about 5 miles away from the old site; up-to-date plant laid down; a number of old servants, who could not meet the fresh conditions of labour placed on good pensions; the price of gas reduced; the income maintained; and the excellent dividend continued. Not only that, but the bare necessities of the case merely have not been taken into account so much as the possibility of a great increase of production—so great that when the town is inhabited by 300,000 (*sic*) people, the supply will still be adequate. Such an achievement is beyond praise; it affords a wonderful object-lesson which local legislators might study to their own enlightenment and the financial advantage of the ratepayers. And just to think of the impudence of the Gas Company in anticipating doubling, trebling, and quadrupling their supply, in spite of the Council's competition of the up-to-date light! It is really taking a mean advantage of the Corporation's unfortunate position in having still to struggle against debt on useless plant."

Tube Trade Combination.

It is reported that a combination has been agreed upon by the steel-tube trade of Scotland and England, to affect both the home and export trades. Two years ago it was arranged to regulate the home trade alone; but as export interests clashed, the combination fell through eighteen months ago. The new undertaking carries permanency with it, it is said, as it has the support of American producers. Circulars have been issued by all the leading houses in the English and Scotch wrought-iron tube trade, announcing an advance in prices of from 7½ to 8⅓ per cent. on the net. The advance is effected by a reduction in the gross discount of 2½ per cent. Referring to the combination, the "Iron and Coal Trades Review" says: "During the past week several more or less misleading reports have been published with reference to the understanding arrived at between tube manufacturers in this country on the subject of the regulation of prices. It will be remembered that the former agreement, which covered the home trade only, became inoperative by common consent about eighteen months ago, but was revived in May last. There having been severe competition and much cutting of prices in the export trade, however, the compact has now been extended to that important branch of the industry, a meeting having been held at which quotations for foreign shipments were fixed. We learn that the agreement includes all the leading makers; and it appears to possess the essential elements of permanency—there being a very general conviction that the more complete understanding now arrived at can be productive of nothing but the most beneficial results to the whole trade, and a firm determination to abide by it with absolute loyalty. The statement that the adherence of German and American manufacturers has been secured, however, appears to be erroneous."

Coventry Corporation and the Supply of Fittings.

The Gas Committee reported to last week's meeting of the City Council that they had received a deputation from the Gas and Electrical Engineers' Association and the Ironmongers and Gas-Fitters' Association upon the question of the Gas Department supplying and fixing gas-fittings (*ante*, p. 715). They had resolved, however, that they could not see their way to make any alteration in the present practice. Mr. Halliwell moved that this portion of the minutes should be referred back. He took strong exception to the practice, on the ground that it was unfair for the Corporation, with their wealth of capital behind them, to enter into competition with ordinary tradesmen, who complained of it most seriously. Alderman Andrews also urged that it was wrong, and said that the business of the department was to sell gas. Mr. Batchelor, the Chairman of the Gas Committee, pointed out that the amount received from this source would not be much more than £100 per annum; and he denied that the Gas Department were pushing the business for all they were worth. They were doing nothing of the kind. They gave special instructions to the foreman that where he found the work could be done efficiently by a private tradesman, he was not to tender against him. Mr. Errington drew attention to the fact that it not infrequently happened that their Manager was consulted about gas-fittings, and had plans prepared. The Committee therefore contended that they had a right to expect some return for this. It was elicited, in the course of further discussion, that in regard to small houses it was the general feeling of occupiers that the department should do the work. Mr. Hill maintained that it was desirable that there should be some certificate of efficiency in regard to gas-fitters and plumbers. The proposal to ask the Gas Committee to reconsider the matter was, however, lost.

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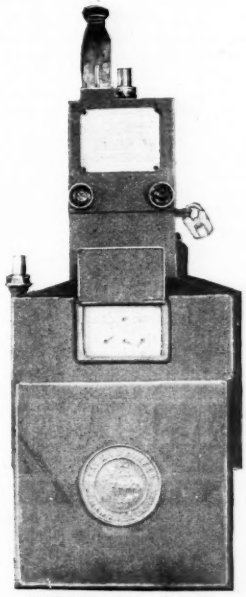

FIRST IN 1889.

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MANCHESTER & NOTTINGHAM.

Coventry Water Supply.—The growth of Coventry has brought with it the necessity for an increased water supply; and at the last meeting of the Town Council a complaint was received from Earlsdon, a suburb, as to shortage at present. A similar complaint was received from the same source only a short time ago; and it was stated that the Water Committee were taking steps to secure fresh sources of supply on land in the neighbourhood of Weston-under-Weatherley. The Earlsdon Defence Committee wrote that they were advised that there could be a claim against the Corporation if they failed to avail themselves of every means at their disposal for furnishing the inhabitants with a full and adequate supply of water; but they were reluctant to take this course. The memorial was referred to the Committee.

Torpoint Gas Company.—A very gratifying report was presented at the first annual meeting of the reconstructed Torpoint Gas Company, which was held last Thursday, under the presidency of Mr. W. J. Waycott. Of the new shares in the Company, 1716 have been taken up out of 2401 offered for subscription. The revenue account showed that the income was £1054 and the expenditure £790, with the addition of £77 for bank charges and interest. Out of the disposable balance of £187, the Directors recommended payment of a dividend of 2½ per cent. The Chairman pointed out that, as the Company had only been in operation about six months, the dividend was equal to 5 per cent. on the year's working; whereas in the old Company the shareholders had for several years been receiving only 2½ per cent. per annum. The consumption of gas had increased about 50 per cent.; and the business was still growing, and was likely to grow. To meet the increasing demand, it would be necessary to almost immediately provide a new bench of retorts. The profit was £113 in excess of that of the previous year. The report and balance-sheet were adopted.

Brighton and Hove General Gas Company.—The report submitted at the half-yearly meeting of this Company last Friday stated that the accounts for the six months to June 30 recorded the continued progress of the business. The sales of gas amounted to 584,548,800 cubic feet, or an increase of 3·8 per cent. over those for the June half of 1905; the gas meter and stove rental yielding an increase of £3822, and residuals an increase of £286. The half-year's profits, including £25 received for interest, amounted to £27,044, to which was added the sum of £12,136 brought forward from the previous six months, giving a total of £39,180. After charging interest on debenture stock, &c., a sum of £36,565 was available for division. The Directors recommended the payment of dividends for the half year at the statutory rates—viz., 6 per cent. per annum on the "B" preference consolidated stock, 4 per cent. per annum on the "C" preference consolidated stock, 11¼ per cent. per annum on the "Original" ordinary consolidated stock, and 8¾ per cent. on the "A" ordinary consolidated stock. These payments would amount to £24,235, and leave a balance of profit of £12,330 to be carried forward.

Lighting of the New Town Hall at Cork.—Some weeks ago, the Cork Law and Finance Committee had before them the subject of the lighting of the new Town Hall (*ante*, p. 594). Offers were submitted both by the Electric Light Company and the Gas Company; and these were relegated to the City Engineer and the City Analyst to report upon. As the result of their report, there was a feeling in favour of gas; and at their last meeting the Committee decided that the hall should be lighted by means of this illuminant. The Chairman (Sir A. Sutton) asked the Engineer whether, in his opinion, gas was as efficient as electricity; and the Engineer replied that without question they could get efficiency out of gas, as well as out of electricity. No guarantee as to the length of the contract has been given to the Gas Company, such as was suggested at the previous meeting. Some objection was raised by the Electric Light Company as to the method in which the Engineer and Analyst had set out their quotation; but even taken on the basis claimed by the Company, they still find that "the gas lighting is cheaper."

Fatal Occurrence at the Neepsend Gas-Works.—An inquiry was held last Tuesday at Sheffield into the circumstances attending the death of a labourer named Wilfrid Young, who had been employed at the Neepsend Gas-Works for eighteen years. According to one of the witnesses, deceased was struck on the back of the neck by a fellow workman, and after walking a few yards he fell to the ground. He was removed to the Royal Infirmary, where he subsequently died. The workman in question—John Hemings—said that he and Young had a bit of a lark together; and he declared that there was no ill-feeling between them. He admitted, however, that there had been some little dispute about a shirt. The doctor stated that death was caused by a fall or a blow—probably a fall. The Jury, after consulting for about ten minutes, returned a verdict that Young's death was due to an effusion of blood on the brain caused by a blow, or a fall after a blow, given by John Hemings. They thought Hemings, though in their opinion he did not intend to do a serious injury to Young, was highly censurable for his conduct. "You have had a very, very lucky escape this time," added the Coroner. "The doctor's evidence just gets you out of it."

Lewes Gas Company.—Speaking at the half-yearly meeting of the Lewes Gas Company, Mr. C. R. Kemp, the Chairman, said he hoped the shareholders would consider the report and balance-sheet satisfactory. They were able to pay the statutory dividends and to carry a small amount to the reserve fund. There had been an increase in the output of gas compared with the corresponding half of the previous year of 1,447,300 cubic feet. This was a very substantial increase, which the Directors were glad to have. He must, however, acknowledge the large proportion of it which came from the prepayment meter accounts, which were a very agreeable and growing portion of their business. At the same time, there had also been an increase in the gas consumed through ordinary meters. Prices of residual products had been less all round; but their receipts in cash were very much the same, as their sales had been more. He thought they might look for an increase in the ordinary accounts in the future, as there was building in progress in Lewes, though they were not a rapidly increasing community. The Solicitor and Secretary (Mr. H. J. Hillman) and the Manager (Mr. Levi Monk) were heartily thanked for their excellent services to the Company.

The "MAIN"

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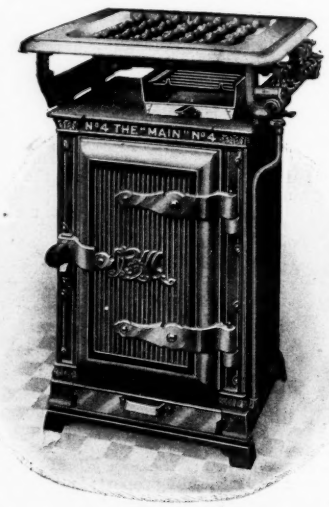
Cooker



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LONDON, GLASGOW, FALKIRK, BRISTOL, MANCHESTER,

BIRMINGHAM, AND BELFAST.

Electric Lamp Causes a Fire in Liverpool.—A disastrous fire took place on Friday at a drapery store in Scotland Road, Liverpool; the damage done being estimated at some £10,000. The outbreak occurred, as it is stated, through the explosion of an electric lamp in the basement, and the ignition of a quantity of silk drapery.

North British Association of Gas Managers.—Mr. R. S. Carlow sends us a photographic reproduction of the group of members and friends assembled at the Granton Gas-Works on the occasion of the annual meeting of the members last July, and asks us to mention that copies may be obtained, price 4s. 6d. each, on application to Mr. Mercer, photographer, Princes Street, Perth.

Biggleswade Water Scheme.—A water scheme at Biggleswade has lately been carried out at a cost of about £61,000. The Local Authorities interested have formed a Water Board, sunk a well 180 feet deep into the greensand formation, tapped an excellent supply of subterranean water which requires no filtering, laid 56 miles of mains, and are now supplying the town of Biggleswade and thirteen surrounding parishes. Mr. Samuel Whitbread made a present of the well to the Board.

Profit-Sharing at Chester.—The bonus due to the employees of the Chester Gas Company, under the profit-sharing arrangement, in respect of the past year's trading, is 5 per cent., or £284. The amount now standing to the credit of the profit-sharers is £761; and besides this, five workmen have purchased £200 of stock in the Company. The scheme has been in operation five years. Presiding last week at a meeting held in connection with the matter, Mr. Gammon, the Chairman of the Company, said the Directors hoped shortly to increase the bonus.

Felixstowe Gas Company's Assessment.—The rating of this Company was increased by the Assessment Committee to £1400 net. To meet this claim the Company retained as their advisers Messrs. W. A. Valon and Son, who made a report and appeared before the Assessment Committee on behalf of the Company, asking for a substantial reduction in the proposed rating. After prolonged negotiations, the Assessment Committee sought the advice of Mr. A. F. Vulliamy. Finally, the Committee consented to reduce the proposed rateable value from £1400 to £650, which was accepted by the Company; the Rating Authority consenting to the condition that this figure should not be disturbed for the next five years.

Tiverton Gas-Works Extensions.—At a meeting on the 10th inst. of the Tiverton Town Council, the Finance Committee reported that the Local Government Board, on issuing their sanction to a loan of £2000 for the purposes of the gas undertaking, had intimated that if the Council desired to borrow the further sum of £240 for mains the Board would be prepared to consider an application for sanction to a loan of that amount. They thought that it would be advisable to obtain the further sum mentioned, which was the amount estimated to be required up to Lady-day, 1908, and recommended that application be made to the Board accordingly, and that advertisements be issued for offers for the above-mentioned sums, for the term of twenty years sanctioned for repayment. The report was adopted.

Bradford Water-Works Loans.—The Bradford City Council have agreed, on the proposition of Alderman Wade, that a Provisional Order shall be promoted in the next session of Parliament for amending the Local Acts so as to provide for an equation period for redemption of the debt of the Corporation for water-works purposes, and for a common or consolidated accumulating sinking fund applicable thereto, superseding such existing provisions as may be necessary. In reply to a question, Alderman Wade said that the Water Committee were faced with a deficit, and wished to obtain an equation of their different loans, by which step anything between £10,000 and £20,000 a year might be saved. The cost of securing the Provisional Order would depend on whether there was opposition. Probably it would be £50 or so.

The Case of Suicide by Gas at Maidstone.—An inquest was held by the Deputy-Coroner (Mr. Robert Hoar), on Monday of last week, into the death of a man named Frederick S. Wood, under circumstances which were briefly recorded in the last issue of the "JOURNAL." The deceased was in the employment of the Maidstone Gas Company; and his widow stated that he had several times threatened to make away with himself. She added that he was hardly safe to live with. He was very quarrelsome, though a good man when sober. When last she saw him alive, he had had some drink. Two of his fellow employees testified that deceased was a steady and regular workman, but very hasty and easily upset by trifles; while the Secretary (Mr. H. Hickmott) said the man had been in the Company's employ for ten or twelve years, and he had never known him the worse for drink while at his work, which was always done to the Company's satisfaction. When Wood was discovered he had been dead some days. He was lying on his bed; and near him was a tube, the other end of which was attached to a gas-stove—the gas being turned full on. The verdict was "Suicide during temporary insanity."

Public Lighting at Halesowen.—The Halesowen Rural District Council have completed arrangements with the Halesowen and Cradley Heath Gas Companies for the lighting of the various parishes comprising their area for the next three years. The agreement with the Halesowen Gas Company provides that the price of the small lamps will be £2 14s. 6d. each per annum; while the large incandescent lamps will be £8 and £6 each per annum. Arrangements have also been made for the lighting of the Parish Church clock throughout the year; and the Company will be responsible for the public lighting in the Hill and Cakemoor districts, which has hitherto been in the hands of the Rowley Gas Company. According to the agreement with the Cradley Heath Company, the large lamps in the parish of Cradley will be lit at the rate of £3 5s. each per annum, and the small ones at £2 10s. per lamp. The lighting season will be eight months in each parish. The Cradley Heath Company undertake to convert all the lamps into incandescent lights within fourteen days of the commencement of the lighting season; while the Halesowen Company guarantee to convert at least fifty small lamps into incandescent lights during the lighting season. Twenty-six additional lamps will be erected throughout the district.

PARKINSON'S GAS-FIRES.

NEW DESIGNS 1906-7.

The "DIADEM."

(Also made with round back and without a back.)

Fitted with a Patented

ADJUSTABLE GAS AND AIR REGULATOR.

Very easily Manipulated.

Write for full Particulars and Prices.

PARKINSON AND W. & B. COWAN, LTD.,

Cottage Lane, City Road, LONDON. | Bell Barn Road, BIRMINGHAM.

Growth of Gas Consumption at Tynemouth.—During the past ten years the output of gas by the Tynemouth Gas Company has increased by practically 70 per cent. In 1896, the make was 257,947,900 cubic feet; and every year since that date has shown an increase, the quantity for 1905 being 437,129,000 feet.

Maryborough (Queensland) Gas Company, Limited.—The profit made by this Company in the six months ending the 30th of June, with the balance brought forward, was £1049. The amount available for distribution was £1010; and it was disposed of as follows: Dividend for the half year at the rate of 6 per cent. per annum, £771; balance carried forward, £239.

Gas and Water Works for Whitland.—Whitland, in Carmarthenshire, is a place which is growing in importance, consequent on the opening of the new Fishguard route of the Great Western Railway to Ireland. It is on the main line to Milford, and is also a junction for several towns. Under these circumstances, the Whitland Water and Gas Company are arranging to put down works for the supply of both gas and water. A good site, with a railway siding, has been secured for the gas-works, most of the mains and plant for which are *en route;* while a supply of very pure water for the district is stated to have been obtained.

Suicide in a Reservoir.—A few weeks ago, there was reported in the "JOURNAL" the case of a man who committed suicide by throwing himself into one of the reservoirs belonging to the Bradford Corporation. During the inquest, the question of contamination was raised; and it was shown by the Engineer (Mr. James Watson) that the matter was chiefly one of sentiment. The same trouble has lately occurred at Jersey, a man having drowned himself in the Water Company's reservoir. In the Bradford case, it was calculated that to have emptied the reservoir would have cost the ratepayers £3725; while if the Jersey Water Company adopt this course, it will lead to a water famine, the supply already being very low.

In open competition, the Admiralty have adopted the Carron Company's "Esto" gas-cookers to be fitted into the artisans' dwellings at their depôt.

Next Saturday, the Junior Institution of Engineers will pay a visit to the "Knight, Bevan, and Sturge" works of the Associated Portland Cement Manufacturers.

Last Saturday evening the electric light failed at Burnley soon after eight o'clock; and the hotels and business establishments in the centre of the town were plunged in darkness.

The Rotary Meter Company (1905), Limited, of Manchester, have just dispatched a 200,000 cubic feet per hour rotary station meter for the Consolidated Gas Company, of New York, a 15,000 feet per hour one for the Norwich Gas and Electric Company, Norwich (N.Y.), a 30,000 feet per hour one for the Bethlehem Consolidated Gas Company, and a 15,000 feet per hour one for the Boone Gas Company, Boone (Iowa). The American Rotary Meter Company not being as yet in a position to cope with the demand as quickly as they would desire, the English Company have manufactured a number of meters for them, and have others in hand.

The Topsham Electric Light Company, at their last meeting, had under consideration several complaints, among them being one by the Gas Company as to the breaking of a wire. The Gas Company had written to the District Council calling attention to the fact that on the evening of the 4th inst. a wire passing close to the gas-works had broken and fallen to the ground, and pointing out that this was a source of danger, as in the event of a wire coming in contact with the gas plant the result would probably be very serious to life and property. The District Council asked that the Electric Light Company should give the matter careful consideration. It was decided to reply that the complaint was without foundation, as the wires were on the opposite side of the street from the gas-works, were fixed in accordance with the Board of Trade regulations, and had not broken.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

WORKING MANAGER. Tetbury Gas Company.
WORKING MANAGER. No. 4651.
STOKER. Pontypool Gas-Works.

As Representative in Australia.

W. G. Quicke, Perth, W. A.

Situations Wanted.

SULPHATE OF AMMONIA PLANT REPAIRER. Firgeson, Warwick Road, S.W.
REPRESENTATIVE. No. 4650.
CHARGE OF SHOW-ROOM, &c. No. 4652.

Company Meeting.

BRITISH GASLIGHT COMPANY. London Offices, Sept. 26. Twelve o'clock.

Gas-Works Wanted on Lease.

No. 4646.

Plant, &c., for Sale.

LIVESEY WASHERS. No. 4648.
STEAM NAVVY. Sheffield Water Department.

Plant, &c., Wanted.

LAMP-POSTS. Redcar Gas-Works.

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Breeze.

COMMERCIAL GAS COMPANY. Tenders by Sept. 26.

Carbon.

COMMERCIAL GAS COMPANY. Tenders by Sept. 26.

Coke.

COMMERCIAL GAS COMPANY. Tenders by Sept. 26.
SHEPPY GAS COMPANY. Tenders by Sept. 26.
WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by Sept. 22.

Pipes, &c.

KING WILLIAMSTOWN MUNICIPALITY. Tenders to London Agent by Sept. 25.

Tar and Liquor.

BLACKPOOL GAS DEPARTMENT. Tenders by Sept. 22.
COLWYN BAY AND COLWYN GAS DEPARTMENT. Tenders by Sept. 25.
MARKET HARBOROUGH GAS DEPARTMENT. Tenders by Sept. 22.

Valves, &c.

KING WILLIAMSTOWN MUNICIPALITY. Tenders to London Agent by Sept. 25.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 751.

Issue.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
160,000	10	,,	7½	Do. 7 p.c.	14½—15½	..	4 16 9
200,000	5	May 11	7	Bomb'ay, Ltd.. . .	6¾—7¼	..	4 16 7
40,000	5	,,	7	Do. New, £4 paid	5—5½	..	5 1 10
50,000	10	Aug. 30	14	Bourne-) 10 p.c. . .	28—29	..	4 18 9
51,810	10	,,	7	mouth Gas) B 7 p.c. .	16⅞—17¼	..	4 1 3
53,200	10	,,	6	and Water) Pref. 6 p.c.	15⅛—16⅛	..	3 12 9
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	260—265	..	4 14 4
300,000	,,	,,	9½	Do. New . .	198—203	..	4 13 7
50,000	,,	,,	5	Do. 5 p.c. Pref. .	120—125	..	4 0 0
206,250	,,	June 14	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Mch. 9	12½	Brighton & Hove Orig.	234—239	..	4 14 2
246,320	,,	,,	8¾	Do. A. Ord. Stk. .	167—172	..	4 15 11
460,000	20	Apl. 11	10	British	41¾—42¼	..	4 14 1
104,000	Stk.	Aug. 15	6	Bromley, Ord. 5 p.c. .	119—123	..	4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c. .	90—93	..	4 16 9
500,000	10	May 11	7	Buenos Ayres (New) Ltd.	12¾—12⅞	..	5 9 10
250,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
150,000	20	July 12	8½	Cagliari, Ltd. . . .	24—26	..	6 6 11
100,000	10	June 14	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref..	9¾—10¼	..	4 7 10
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	June 28	4½	Do. 4½ p.c. Deb. Stk.	98—100	..	4 10 0
1,443,280	Stk.	Aug. 30	5⅛	Commercial 4 p.c Stk. .	113—115	+1	4 10 5
560,000	,,	,,	5	Do. 3½ p.c. do. .	110—112	..	4 9 3
475,000	,,	June 14	3	Do. 3 p.c. Deb. Stk.	84—86	..	3 9 9
800,000	Stk.	,,	6¼	Continental Union, Ltd.	123—126	..	5 3 2
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—145	..	4 16 7
432,070	Stk.	Aug.	5½	Derby Con. Stk. . . .	122—124	..	4 8 9
55,000	,,	July	4	Do. Deb. Stk. . . .	105—107	..	3 14 9
486,090	10	July 27	11	European, Ltd. . . .	24—25	..	4 8 0
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 10
15,203,110	Stk.	Aug. 15	4⅛	Gas-) 4 p.c. Ord. . .	99—100	..	4 8 0
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	88—90	+1	3 17 9
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	108—111	..	3 12 1
4,193,975	,,	June 14	3	Coke) 3 p.c. Con. Deb.	86—88	..	3 8 2
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	98—103*	+½	4 17 1
82,500	,,	,,	6½	Do. do. 5 p.c.	118—121*	+¼	5 7 5
70,000	10	Apl. 11	11	Hongkong & China, Ltd.	20—21	..	5 4 9
940,000	Stk.	May 11	8	Imperial Continental .	188—191	+1	4 3 9
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	95—97	..	3 12 2
183,242	Stk.	Aug. 30	6	Lea Bridge Ord. 5 p.c. .	120—125	..	4 16 0
£			p.c.				£ s. d.
561,000	Stk.	Aug. 30	10	Liverpool United A . .	230—232	..	4 6 2
718,100	,,	,,	7	Do. B . .	168½—170½	..	4 2 1
306,083	,,	June 28	4	L'rpool Unit'd Deb. Stk.	107—109	..	3 13 5
75,000	5	June 28	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
560,000	100	Apl. 2	5	Met. of) 5 p.c. Deb..	103—105	..	4 15 3
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	102—104	..	4 0 7
541,920	20	May 31	3½	Monte Video, Ltd. . .	11—12	..	5 16 8
1,675,892	Stk.	Aug. 15	4½	Newc'tle & G'tesh'd Con.	1 0—112	..	4 2 7
406,025	Stk.	June 29	3½	Do. 3½ p.c. Deb.	98—100	+1	3 10 0
15,000	10	Aug. 30	10	North Middlesex 10 p.c.	20—21	..	4 15 3
55,940	10	,,	7	Do. 7 p.c.	13½—14½	..	4 16 7
300,000	Stk.	May 11	8	Oriental, Ltd. . . .	151—154	+1	5 3 11
60,000	5	Sept. 13	7	Ottoman, Ltd. . . .	5⅜—6⅛*	..	5 12 0
398,490	5	Apl. 26	7	Primitiva Ord. . . .	6¾—7¼	..	4 16 7
796,980	5	July 27	5	Do. 5 p.c. Pref. .	5—5¼	..	4 15 3
488,900	100	June 1	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
851,070	10	Apl. 26	7	River Plate Ord. . . .	12⅜—13¼	+⅛	5 5 8
300,000	Stk.	June 28	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
250,000	10	Mch. 28	8	San Paulo, Ltd. . . .	14¼—14⅜	..	5 5 8
70,000	50	July 2	5	Do. 5 p.c. Deb. .	49—51	..	4 18 0
135,000	Stk.	Mch. 28	10	Sheffield A	244—246	..	4 1 4
209,984	,,	,,	10	Do. B	244—246	..	4 1 4
523,500	,,	,,	10	Do. C	244—246	..	4 1 4
70,000	10	May 31	10	South African	16—17	..	5 17 8
6,350,000	Stk.	Aug. 15	5½	South Met., 4 p.c. Ord.	132—134	..	4 2 1
1,895,445	,,	July 12	3	Do. 3 p.c. Deb.	86—88	..	3 8 2
575,000	Stk.	Aug. 15	5½	S'th Suburb'n Ord, 5 p.c.	123—126	+1	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	123—126	..	3 19 4
112,533	,,	July 12	5	Do. 5 p.c. Deb. Stk.	128—133	..	3 15 2
502,310	Stk.	May 11	5	Southampton Ord. . .	107—112	..	4 9 3
120,000	Stk.	Aug. 30	6½	Tottenham) A 5 p.c. .	125—130	..	5 0 0
388,020	,,	,,	5	and) B 3½ p.c. .	100—103	..	4 17 1
137,500	,,	June 28	4	Edmonton) 4 p.c. Deb.	103—105	..	3 16 2
182,380	10	June 14	8	Tuscan, Ltd.	10¼—10⅝	..	7 8 10
149,900	10	July 2	5	Do. 5 p.c. Deb. Red.	100—103	..	4 17 1
30,000	Stk.	Aug. 15	8	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6½	worth) B 3½ p.c. . .	137—142	..	4 11 7
75,000	,,	,,	5⅝	and) C 3½ p.c. . .	113—115	..	4 17 5
79,416	,,	June 28	3	Putney) 3 p.c. Deb. Stk.	82—85	..	3 10 7
779,875	,,	Aug. 15	5⅜	West Ham 5 p.c. Ord. .	105—107	..	4 15 9
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	120—123	..	4 1 4
193,300	,,	June 28	4	Do. 4 p.c. Deb. Stk.	103—106	..	3 15 6

Prices marked * are "Ex div."